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ABSTRACT

The National Longitudinal Transition Study (NLTS) of Special Education Students provides ongoing information regarding the transition of youth with disabilities from secondary school to early adulthood. The sample for the study, which began with a 1987 survey (Wave 1), involved more than 8,000 youth from the national population of secondary special education students. Wave 1 had four major components: the parent interview, abstraction of data from school records, the survey of secondary special education programs, and the nonresponse study. This report describes the study's sample and study design features, including the definition of the universe; the methods used to build the sampling frame and select the sample; the response rates and efforts to increase them; procedures for weighting the data; and limitations of the sample and design. Conclusions address: (1) how well the sample is able to estimate school status; (2) comparison of the NLTS estimates of the number of students in each disability condition with U.S. Department of Education counts; and (3) limitations of the sample. The report examines the relatively high nonresponse rates but concludes that the NLTS meets high standards with respect to its procedures and will prove to be useful and valid for policy decisions and for social and scientific analyses. Sixteen tables detail the report's findings. (DB)

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ED 368 151

THE NATIONAL LONGITUDINAL TRANSITION STUDY OF SPECIAL EDUCATION STUDENTS

Report on Sample Design and Limitations, Wave 1 (1987)

September 1990

Prepared for:

The Office of Special Education Programs
U.S. Department of Education

Prepared by:

Harold S. Javitz, Senior Statistician
Mary Wagner, Project Director

The National Longitudinal Transition Study of Special Education Students is being conducted by SRI International under Contract 300-87-0054 with the Office of Special Education Programs, U.S. Department of Education.

SRI International

National Longitudinal Transition Study

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National Longitudinal Transition Study

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OVERVIEW

This report documents the sample design and limitations of wave 1 of the National Longitudinal Transition Study (NLTS) of Special Educational Students. This overview section describes the role of this report in the NLTS methodology report series, describes the purposes of the NLTS, summarizes the major NLTS survey components and the types of information obtained from each component, and provides a timeline of the major sampling and data collection milestones.

Methodology Reports

This is the second in a series of three methodology reports documenting procedures used to obtain and analyze nationally representative data concerning the transition of secondary school special education students to early adulthood. These reports include:

- The *Report on Procedures for the First Wave of Data Collection (1987)* describes the data collection instruments and procedures (Wagner, Newman, and Shaver, 1989).
- This report describes the procedures used to define the sampling frame, select the sample, and compute sample weights.
- The third report (in preparation) deals with the formation, reliability, and validity of variables used in tabulations and other analyses.

Study Purpose

The NLTS was mandated by the U.S. Congress in 1983 to provide information to practitioners, policymakers, researchers, and others in the special education community regarding the transition of youth with disabilities from secondary school (grade 7 or above) to early adulthood. In particular, Congress was interested in taking stock of how youth with disabilities were faring under the Education of the Handicapped Act (EHA) in terms of receiving education and related services that would help them make a successful transition from school to employment and independent living. The Office of Special Education Programs (OSEP) of the U.S. Department of Education contracted with SRI International to determine a design, develop and field test data collection instruments, and select a sample of students for a study that would meet the congressional mandate. In April 1987, after completing the study design, SRI began the actual study.

In the field of research on youth with disabilities, the NLTS is unique in several respects. The NLTS sample is large, permitting us to estimate with fairly high precision many of the characteristics of youth with disabilities and their experiences in adolescence and early adulthood. The data were collected in 1987 for a nationally representative sample of more than 8,000 youth who were secondary special education students in the 1985-86 school year. It is also nationally representative of youth in each of the 11 federal disability categories. Therefore, for the first time we know on a nationwide basis what the transition experiences were for youth with mental retardation, for example, and how they differed from those of youth with orthopedic impairments or multiple handicaps.

The NLTS is also unusual in its longitudinal design. The students for whom data were gathered in 1987 are being tracked through the years of the study so that follow-up data can be collected about them late in 1990. These follow-up data will enable the estimation of trends in experiences as youth age. For example, we will be able to describe the movement in and out of jobs and in and out of school that often characterizes youth in these "floundering years." Finally, the NLTS is extremely broad in scope, gathering information on a wide range of characteristics, experiences, and outcomes of youth with disabilities, including the following:

- Individual characteristics (e.g., disability-related characteristics and severity).
- Family characteristics (e.g., demographics).
- Parent expectations for youth in the areas of education, employment, and independence.
- Social experiences (e.g., belonging to school or community groups, socializing with friends).
- School programs (e.g., courses taken, related services provided, educational placements).
- School characteristics and policies (e.g., type of school attended, policies related to mainstreaming, programs available for special education students).
- School achievement and completion (e.g., grades received, absenteeism, dropout/graduation behaviors).
- Services provided by the school and other sources (e.g., job training, physical therapy, counseling).
- Employment characteristics (e.g., rates of employment, job types and duration, wages).
- Independent functioning (e.g., residential independence, financial independence, functional abilities).
- Postsecondary education participation in vocational schools and 2-year and 4-year colleges.

The study addresses both descriptive and explanatory research questions. The focus of description is to understand better the patterns of experiences of youth in school and in transition to adulthood. The primary explanatory research questions involve identifying factors that are associated with the effective transition of youth with disabilities from secondary school to employment, further training and education, and independent living. Of particular interest is identifying what schools do in the way of programming, staffing, and organization that is associated with successful transition.

To document several aspects of the study methods, the NLTS is producing a series of three reports that describe (1) the sample and the study's design limitations, (2) data collection procedures, and (3) measurement and analysis approaches. This report documents the sample design used to develop the primary database* for the NLTS, including the definition of the universe; the methods used to build the sampling frame and select the sample; the response rates and efforts to increase them; procedures for weighting the data; and limitations of the sample. Knowing how the sample was generated and weighted, and limitations of the sample (caused primarily by different types of nonresponse, as explained later), provides a context for understanding the nature and meaning of the findings the study generates. Documenting sampling procedures from a study that is this large and complex can also provide useful guidance to other researchers who will be working in the transition arena in the future.

Study Components

NLTS data collection and analyses are guided by a conceptual framework (shown in Figure 1) that specifies the main categories of factors expected to influence transition outcomes. Several sources of information were used to obtain the data needed to elaborate the categories in the framework. For example, data regarding school and district factors and school programs were best collected from school personnel and records, while family characteristics were best reported by parents of youth in the sample.

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* The "primary database" refers to data intended to be collected for the full sample and is the database used for most analyses. Additional data are being collected for selected subsamples of youth; the designs of those substudies are documented in separate reports about the substudies.

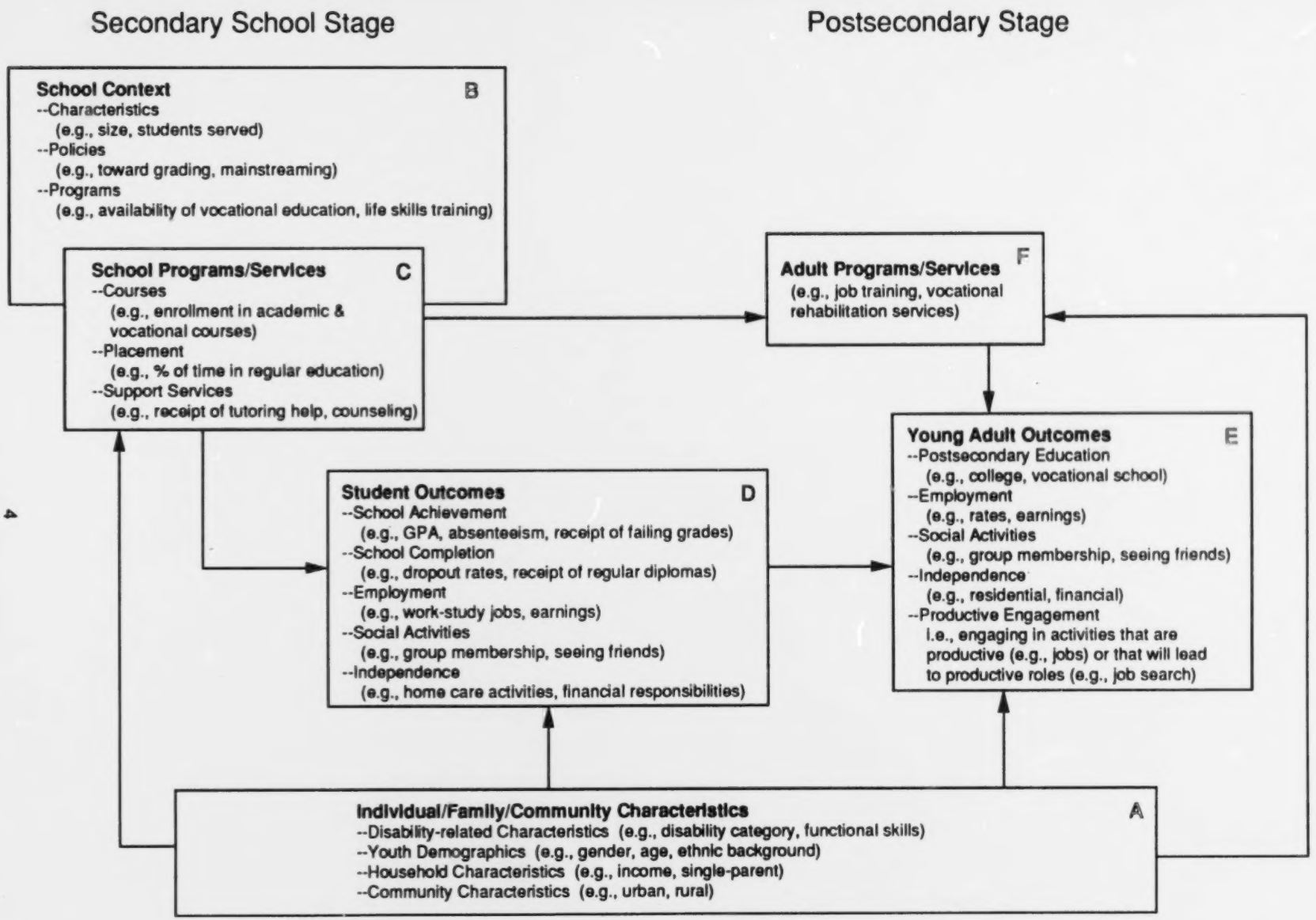

FIGURE 1 CONCEPTUAL FRAMEWORK OF TRANSITION EXPERIENCES AND OUTCOMES OF YOUTH WITH DISABILITIES

Four data collection components were designed to obtain the data specified by the conceptual framework:

- ***The parent interview.*** The parents/guardians of sample youth were administered a structured interview by telephone in the summer and fall of 1987 to obtain information on youths' individual and family characteristics; services received; social integration; outcomes in the areas of employment, educational attainment (including postsecondary education), and independence; and parent expectations of future achievements. This survey will be repeated in 1990, when youth will be interviewed if they are able to respond.

- ***Abstraction of data from school records.*** School or district staff were recruited in the 1987-1988 school year to abstract data from school records for the most recent year youth were in secondary school (either 1986-87 or 1985-86) and to record the data on forms provided by SRI. School record data concerned the disabilities for which youth received special services, grade level in school, educational setting, courses taken, grades received (if in a graded program), related services provided, attendance, IQ, minimum competency test experiences, and end-of-year status (e.g., dropped out, graduated, promoted to next grade level). School transcripts will be collected in 1990-91 for youth who had been in secondary school at any time since the 1986-87 school year.

- ***The Survey of Secondary Special Education Programs.*** A mail questionnaire was sent to the principals of the secondary school most recently attended by each youth. The first part of the questionnaire related to general characteristics of the school and its student body and was usually completed by the principal. Later sections of the questionnaire related to specific kinds of services and instruction provided to secondary special education students (e.g., life skills training, job skills training) and were usually completed by special education personnel. The later sections also addressed community resources for the disabled.

- ***The Nonresponse Survey.*** In survey research, there is always a concern that respondents to a survey differ systematically in some way from nonrespondents, thereby introducing bias into the survey data. To determine whether bias existed in the parent/guardian telephone interview data, in-person interviews were conducted with a sample of parents/guardians who had not been reached by telephone. These parents/guardians were administered a somewhat simplified version of the parent/guardian questionnaire. By comparing the sample of nonrespondents with parents/guardians who had responded to the telephone survey, bias in the sample was identified and partially adjusted for.

Further information about the content of these questionnaires and the procedures used to collect the data (including procedures for encouraging response) is available in the NLTS *Report on Procedures for the First Wave of Data Collection (1987)* (Wagner, Newman, and Shaver, 1989).

NLTS Wave 1 Sampling and Data Collection Milestones

The next few sections discuss the procedures used to select the NLTS sample, obtain the data, and weight them. Critical NLTS wave 1 sampling and data collection activities and their associated dates were as follows:

- Select the initial sample of 450 local education agencies (LEAs) (10/85).
- Recruit initial LEA sample to participate in the study (10/85 to 6/86).
- Select sample of state-operated schools for the deaf and blind (12/85).
- Recruit state schools to participate in the study (12/85 to 5/86).
- Select supplemental sample of LEAs to replace those refusing to participate (2/86).
- Recruit replacement LEAs to participate in the study (2/86 to 6/86).
- Select students from rosters of participating LEAs and state-operated schools and obtain student addresses and telephone numbers (10/85 to 9/86).
- Solicit written parental consent for sampled students to participate in the study (5/86 to 10/86).
- Notify LEAs, state-operated schools, and parents that the NLTS study is beginning (5/87).
- Main wave of telephone interviewing of parents (6/87 to 9/87).
- Follow-up telephone interviewing of parents (9/87 to 11/87).
- Identify schools attended by sampled students (10/87 to 12/87).
- In-person interviewing of nonrespondents to the telephone interview (11/87 to 2/88).
- Recruit data abstractors in schools attended by sampled students, abstract school records, and administer secondary school program survey (1/88 to 7/88).
- Analysis of nonrespondent bias and adjustment of sample weights (5/88 to 8/88).

THE LEA SAMPLE

The focus of the NLTS is to make reasonably precise estimates about what happened to special education students (overall and by disability category as defined by the federal government*) in the context of their local environment, which includes the local education agency (LEA) and other community resources. In selecting the sample, the LEA served as the vehicle to obtain a sample of special education students; it is the primary sampling unit. The special education student constitutes the secondary or final sampling unit. This section describes the procedures used to define the universe of LEAs, create the sampling frame, stratify the LEAs in the sampling frame, select LEAs for inclusion in the sample, obtain LEA rosters of secondary special education students, and assess the amount of nonresponse bias associated with the LEA participation rate.

Defining the Universe of LEAs

The first step in defining the universe of LEAs involved conferring with OSEP and the National Center for Education Statistics (NCES). The universe was initially defined as all operating LEAs offering grade 7 or higher. Nonoperating LEAs that did not administer any schools were eliminated from consideration,** as were various categories of local and state educational "districts" that appear on standard listings of educational institutions, including (1) vocational-technical districts (except ones that operated as regular LEAs); (2) supervisory unions, area educational agencies, interim districts, boards of county education services, or other superordinate units; (3) public agencies, such as state education agencies (with the exception of the Department of Education in Hawaii, which is an LEA); (4) Bureau of Indian Affairs schools; (5) achievement centers and regional resource centers; (6) private agencies, such as homes for delinquent youth; (7) Texas Independent State School Districts, which primarily are correctional facilities and homes for delinquent youth; and (8) LEAs from Puerto Rico, Guam, and other territories. Because of the focus on special education students in secondary schools, districts that served only students in kindergarten through sixth grades were also excluded. Districts that served 10 or fewer students were excluded because, on average, approximately 10% of all students are in special education, and so these districts would not be expected to have any special education students.

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* The 11 handicapping conditions are learning disabled, mentally retarded, seriously emotionally disturbed, orthopedically impaired, speech impaired, deaf, hard of hearing, visually impaired/blind, deaf/blind, other health impaired, and multiply handicapped.

** According to NCES, a nonoperating system is a self-contained local public school system having its own decision-making board of control that does not operate schools, but pays tuition to other operating systems for the education of the children living within its boundaries.

Creating the Sampling Frame

To create a sampling frame or master list of LEAs, a composite database was developed from several available sources, including the most current data from the public school universe file maintained by Quality Education Data (QED),* and the National Center for Education Statistics (NCES) tapes for 1980-81 and 1981-82. When necessary, these data were supplemented with telephone calls to individual states and districts.

Using these sources, a master list of LEAs was created, using the following procedures:

- Obvious errors on each tape were eliminated, such as blank or duplicate records, no names, spelling errors, invalid codes, and extreme outliers. This was accomplished by comparing data on all tapes and, when necessary, calling states and LEAs for information.

- All nonoperating LEAs, supervisory unions, vocational-technical districts, and relevant public agencies were removed (see previous discussion).

- Using QED (1983) and NCES (1980-81) data, an LEA was included on the master list if (1) the district identification number was on both sources or (2) the number was on at least one source and was verified by the later NCES (1981-82) tape and a telephone call.

- When an LEA was not listed by all sources, checks were made for incorrect or changed district names and altered district identification numbers. When this possibility was taken into account, we found that many districts were on all three sources but were listed under different names or identification numbers. Data were then merged into a single record. In general, the QED identification number and/or district name was used when sources disagreed because the names and addresses of school officials from QED were to be used to obtain permission to participate in the longitudinal study.

- QED had artificially merged some K-8 and 9-12 LEAs for mailing purposes. In these cases, NCES 1981-82 data were used, which kept them separate.

- Checks were made for LEAs that had the same identification number on different tapes but had different names. Most were a result of different spellings or misspellings. When there were discrepancies, the most appropriate name was selected (usually QED's), and LEAs were separated and merged as appropriate.

To test the accuracy of the initial master list of secondary LEAs, it was matched with lists of LEAs submitted by seven states directly to SRI. There was a 99.75% agreement between the two lists.

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* The 1983 Quality Education Data, Inc., (QED) database was used both to construct the sampling frame for school districts and to conduct an analysis of the differences between participating and nonparticipating districts. QED is a private nonprofit firm located in Denver, Colorado.

In this way, an initial master list was developed, containing 13,975 secondary-level LEAs that were expected to have at least one special education student. This list was later revised on the basis of an SRI survey of 1,600 of these LEAs (described later) to reflect the fact that approximately 5.7% of districts no longer offered secondary-level instruction or had merged with other LEAs. The revised universe contained an estimated 13,180 LEAs.*

Stratifying the Universe

To increase the precision of estimates that would have resulted from a simple random sample, and to increase the representativeness of the sample, the LEA universe was stratified by region, district size (enrollment), and a measure of district wealth. These variables, their sources, and the rationale for their selection are described below.

Region—The region variable captures essential political differences, as well as subtle differences in the organization of schools, the economic conditions under which they operate, and the character of public concerns. For example, at the time that the LEAs were selected, the "sunbelt" Southern states had growing enrollments together with relatively healthy economies that were able to support various endeavors to improve education, whereas the declining industrial states of the Northeast faced decreases in the resources that could be used for school improvement.

For this study, the regional classification variable used by the Department of Commerce, the Bureau of Economic Analysis, and the National Assessment of Educational Progress was adopted:

- ***Northeast.*** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.
- ***Southeast.*** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.
- ***Central.*** Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.
- ***West/Southwest.*** Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oklahoma, Oregon, Texas, Washington, Wyoming, and Utah.

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* This total does not include the unknown number of LEAs that did not offer secondary-level instruction when the original list was compiled and subsequently did offer such instruction, or the unknown number of LEAs that disassociated from larger LEAs after the original list was compiled.

District Size (Enrollment)—LEAs vary considerably by size (the most useful available measure of which is pupil enrollment). A host of organizational and contextual variables with considerable potential influence over the operations and effects of special education and related programs are associated with size. These include the extent of district administrative/supportive capacity, the degree of specialization in administrative structure, the nature of citizen and interest group activity in education, and the characteristic relationship with state and federal governance systems. In addition, total enrollment served as an initial proxy for the number of special education students served by a district.

The district size stratification variable was initially a nine-category scale, the first seven of which corresponded to the scale used in NCES research. After examining the number of districts and proportions of students accounted for by each of these nine categories and various other demographics of the LEAs, categories were merged into six enrollment strata. These were defined to be consistent with other research and to ensure that each stratum of LEAs was homogeneous, yet more or less distinct from other strata. The principal strata were:

- ***Huge districts*** (enrollment of 50,000 or greater). These were typically districts in large urban centers. This stratum contained fewer than 1% of LEAs but slightly more than 17% of secondary students.

- ***Very large districts*** (enrollment between 25,000 and 49,999). These were typically districts in medium to large cities or large county systems, which often were organizationally complex and very likely to be divided into subdistricts. Very large LEAs constituted fewer than 1% of districts but almost 9% of students.

- ***Large districts*** (enrollment between 10,000 and 24,999). These were districts in small to medium-sized cities or large county systems. They were also organizationally complex, but these systems tended to be centralized. Large districts constituted 3.5% of LEAs and served approximately 18% of secondary students.

- ***Medium-sized districts*** (enrollment between 2,500 and 9,999). Typically, these were suburban districts, districts in large rural towns, or small county systems. Medium-sized districts constituted 22% of LEAs and served approximately 35% of secondary students.

- ***Small districts*** (enrollment between 500 and 2,499) . Most were rural districts. This stratum accounted for 38.5% of LEAs and served 17% of secondary students.

- ***Very small districts*** (enrollment fewer than 500). These were small rural districts. This stratum accounted for 34% of LEAs but served only 3% of secondary school students.

An additional logistical reason for stratifying on district size was to reduce the number of LEAs that would need to be sampled to achieve adequate representation among larger districts. For example, without stratification, we would expect, out of a sample of 500 LEAs, to select fewer than 25 huge, very large, or large districts, even though these strata account for 44% of all students.

District/Community Wealth—The ratio of students receiving Title I funds to the total student population in an LEA was used as a measure of district/community wealth and as an initial proxy for the amount of services available in the community surrounding the LEA. This index estimated the percentage of youth in an LEA who were below the poverty level. It was hypothesized that this index would relate to the types of programs offered in schools and to the services likely to be available in a community. Four categories of this variable were created for sampling purposes:

- ***High*** (0% to 4% disadvantaged youth). It was hypothesized that LEAs with very small percentages of low-income youth would, in general, be least influenced by these youth when making decisions about programs. As relatively high-wealth districts, one would expect them to have a relatively large number of services available in the surrounding community.

- ***Medium*** (5% to 9%). It was hypothesized that LEAs with 5% to 9% low-income students would be more likely than wealthy districts to take these youth into account when making decisions about programs. The overall impact on programs, however, might be limited. We expected, on the average, fewer community services to be available in these LEAs than in LEAs in the low and very low categories.

- ***Low*** (10% to 19%). LEAs with 10% to 19% low-income youth would be more likely to take these youth into full account when making decisions about programs. One would expect a greater awareness of the problems of these youth (and possibly of special education students if the disadvantaged and special education programs overlapped). In some cases, even fewer community services would be available than in wealthier districts. However, as the district and the community received federal and state funds to respond to the larger disadvantaged population, more services might be available.

- ***Very low*** (20% and over). It was assumed that with large numbers of disadvantaged youth, the entire academic program would be affected. As the percentage increased, programs for disadvantaged youth would dominate the curriculum. The services available would depend greatly on the amount of federal and state assistance received.

The three variables generated a 96-cell grid into which the entire universe of LEAs was distributed.

Selecting LEAs for Inclusion in the Sample

To obtain additional information on a larger number of districts than would eventually be included in the LEA sample, SRI randomly selected a first-stage stratified sample of 1,600 LEAs (approximately 11% of the secondary LEA population) by allocating the 1,600 LEAs among size strata so that (1) all huge and very large districts were chosen, (2) a majority of the large districts, with enrollments between 10,000 and 25,000, were included; (3) the remaining sampled LEAs were distributed among the other strata in approximate proportion to the number of students contained in each. The net effect of these decisions was to ensure the selection of a very high proportion of larger districts and a lower proportion of smaller districts. Weighting procedures (described later in this report) were used to adjust estimates for unequal LEA (and student) selection probabilities and for nonresponse bias.

At SRI's request, Chilton Research Services (CRS) conducted a survey of the 1,600 LEAs in the first-stage sample to determine more precisely the services available to special education students and to estimate the number of special education students served by each district. The survey revealed that 47 LEAs classified by NCES as offering secondary school instruction no longer did so. In addition, 4 LEAs had merged with other districts and were no longer distinct entities. Subtracting these 51 LEAs from the first state sample of 1,600 left a sample of 1,549 districts. Of these, 1,450 responded and 99 either refused to participate or were not reached, yielding a response rate for secondary-level LEAs of 93.6%.

The estimated number of LEAs offering grade 7 or higher in the universe was revised by eliminating the proportion of LEAs in each stratum found not to have grade 7 or higher.* The result was a revised estimated universe of 13,180 LEAs (reduced from 13,975).

A second-stage sample of 450 LEAs was selected from the 1,450 respondents to the first-stage survey, using stratified random sampling procedures. The number of selected LEAs in each stratum was approximately proportional to the number of LEAs in the first-stage sample. The procedures used to contact these LEAs are described in the next section. As described there, the response rate among the 450 LEAs was not as high as desired, so the second-stage sample was augmented with an additional sample of 178 LEAs selected from the same sampling strata as refusals from the original set of 450. In total, 303 LEAs participated in the NLTS.**

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* For example, if in a stratum, 2 of 10 sample LEAs were found no longer to teach secondary students, and the original universe listed 50 LEAs in that stratum, we multiplied the proportion (2/10) by the stratum population (50), and subtracted this number from the original universe number. In this example, the revised estimated number in the universe for this stratum would be 50 - [(2/10) (50)] = 40. The estimate does not include an adjustment for nonresponse.

** In addition, as described later, 84 state-operated schools for the deaf and visually impaired were added to the sample, and 22 of these schools participated in the NLTS.

Table 1 displays the revised universe of secondary school districts and the number of secondary school districts that participated in the survey by region, enrollment size, and district wealth.

Obtaining LEA Rosters of Secondary Special Education Students

In the summer of 1985, the U.S. Department of Education sent letters to the state special education directors of all 50 states describing the NLTS and requesting permission to contact sampled school districts about participation in it. Every state granted approval to contact districts. In October 1985, SRI sent a letter about the study to the superintendents of 450 districts that were selected in the original sampling process. The letter briefly described the purpose of the study, invited the district to participate, and requested that district personnel provide a roster of all special education students in grades 7-12 who were also ages 13-21 (e.g., excluding 12-year-old 7th-grade students) in the district at that time. The instructions to districts asked that they include in their rosters special education students for whom the district is legally or financially responsible, even if those students did not attend one of the district's schools (e.g., they attended a private day school, a state-operated school for the deaf or blind, a neighboring school district, etc.).* Information requested of the districts included the name of the student, the type of disability (using the 11 federal categories), the birth date or age of the student, the grade level of the student, and the name of the school or agency that the student attended. District staff were informed that SRI would be using the rosters to select students randomly to be in the study and that we would be contacting the parents of selected students to request their voluntary participation. In the mailing was a copy of a letter from the U.S. Department of Education, Family Educational Rights and Privacy Act (FERPA) office, stating that SRI was an authorized representative of the U.S. Department of Education and that, for the purpose of this national evaluation of a federally sponsored program, education agencies could release student information to SRI without violating FERPA. Also enclosed were instructions about providing roster information and a roster cover sheet. (Roster information could be provided on a computer tape or printout; an existing document, such as a class list, that contained the necessary information on each special education student; or a hand- or typewritten roster on a form SRI provided). Districts that did not respond within the first 2 weeks were sent a reminder letter. Two weeks following the second letter, project staff called staff in districts that had not yet responded to our request to explain the study, answer questions about it, discuss how student rosters could be provided, and generally encourage participation in the study.

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* Districts followed a variety of policies concerning the listing of such students, and some districts may have omitted them from their lists. In addition, some severely disabled special education students may never have been in LEAs. Thus, the NLTS sample of students from LEA rosters is likely to exclude some of the most severely disabled students. A supplemental sample of special education students from state-operated schools for the deaf and blind (discussed later) increased the representation of severely disabled students in some handicapping conditions (i.e., deaf, hard of hearing, visually impaired, blind, deaf/blind, and, to a lesser extent, multiply handicapped).

Table 1
NUMBER OF LEAS IN THE UNIVERSE AND NUMBER OF STUDY PARTICIPANTS

Enrollment Size		Northeast District Wealth * 0-4%	Northeast 5-9%	Northeast 10-19%	Northeast 20%+	Southeast 0-4%	Southeast 5-9%	Southeast 10-19%	Southeast 20%+	Central 0-4%	Central 5-9%	Central 10-19%	Central 20%+	West/Southwest 0-4%	West/Southwest 5-9%	West/Southwest 10-19%	West/Southwest 20%+	Total
Huge	Population N	2	2	2	4	1	2	14	6	0	0	6	2	1	5	11	2	60
50,000+	% LEAs	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5
	% Sec. students	0.5	0.4	0.7	3.0	0.3	0.3	3.1	1.2	0.0	0.0	2.3	0.3	0.1	1.2	3.6	0.3	17.4
	Respondent N	1	2	2	4	0	2	7	5	0	0	5	2	1	4	6	1	42
Very Large	Population N	0	1	4	0	0	5	15	20	3	6	8	0	6	13	16	6	103
25,000-	% LEAs	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.8
49,999	% Sec. students	0.1	0.1	0.3	0.0	0.0	0.5	1.3	1.7	0.2	0.5	0.7	0.0	0.6	1.1	1.4	0.6	8.9
	Respondent N	0	1	1	0	0	2	5	6	1	3	2	0	3	4	4	1	33
Large	Population N	20	21	22	7	1	6	53	64	38	38	18	1	22	64	61	23	459
10,000-	% LEAs	0.2	0.2	0.2	0.1	0.0	0.0	0.4	0.5	0.3	0.3	0.1	0.0	0.2	0.5	0.5	0.2	3.5
24,999	% Sec. students	0.6	0.8	0.8	0.3	0.0	0.2	2.0	2.5	1.3	1.4	0.7	0.0	0.9	2.7	2.6	0.9	17.8
	Respondent N	1	3	3	1	1	1	3	7	2	4	1	1	2	6	2	1	39
Medium	Population N	343	288	170	21	10	11	157	535	325	326	153	21	78	165	207	128	2938
2,500-	% LEAs	2.6	2.2	1.3	0.2	0.1	0.1	1.2	4.1	2.5	2.5	1.2	0.2	0.6	1.3	1.6	1.0	22.3
9,999	% Sec. students	4.0	3.2	1.9	0.3	0.1	0.1	2.2	6.7	4.0	3.7	1.5	0.2	1.2	2.3	2.6	1.4	35.4
	Respondent N	6	7	1	2	1	2	5	10	6	5	3	2	3	3	5	3	64
Small	Population N	364	400	315	44	22	9	69	481	432	691	849	232	104	191	390	487	5080
600-	% LEAs	2.8	3.0	2.4	0.3	0.2	0.1	0.5	3.5	3.3	5.2	6.4	1.8	0.8	1.4	3.0	3.7	38.5
2,499	% Sec. students	1.4	1.6	1.1	0.1	0.1	0.0	0.3	1.9	1.4	2.4	2.6	0.6	0.3	0.6	1.3	1.5	17.3
	Respondent N	4	4	3	2	1	2	2	5	6	9	11	2	0	4	9	6	70
Very Small	Population N	240	74	99	31	87	2	8	120	615	283	561	446	1323	94	178	379	4540
0-599	% LEAs	1.8	0.6	0.8	0.2	0.7	0.0	0.1	0.9	4.7	2.1	4.3	3.4	10.0	0.7	1.4	2.9	34.4
	% Sec. students	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.3	0.2	0.5	0.4	0.6	0.1	0.2	0.4	3.1
	Respondent N	3	2	1	0	2	0	1	1	9	5	7	7	12	4	1	0	55
Total	Population N	969	786	612	107	121	35	316	1226	1413	1344	1595	702	1534	532	863	1025	13180
	% LEAs	7.4	6.0	4.6	0.8	0.9	0.3	2.4	9.3	10.7	10.2	12.1	5.3	11.6	4.0	6.5	7.8	100.0
	% Sec. students	6.6	6.1	5.0	3.8	0.6	1.2	8.8	14.1	7.2	8.3	8.4	1.6	3.6	8.0	11.6	5.0	100.0
	Respondent N	15	19	11	9	5	9	23	34	24	26	29	14	21	25	27	12	303

* Percentage of students in poverty.

Most responding districts provided SRI with printouts or SRI forms that contained the necessary information on each special education student. Two categories of exceptions were as follows:

- Four very large or huge districts with computer capabilities requested that they select the sample rather than send us hundreds of pages of roster information. These districts first provided counts of special education students by disability category and by student age (13-15, 17-18, and 19-21). From these counts, SRI determined the number of youth in each sampling category to select and provided detailed instructions on how to select the sample. Families who wished to participate returned completed consent forms to SRI.

- District staff from 28 other LEAs who were concerned about violating student confidentiality rights by giving us student names were informed that, rather than release the names of students, they could provide a roster with an identification number or initials for each student. In these cases, SRI staff selected the sample and informed the district of the ID numbers or initials of the students selected.

Special education students sampled from these districts accounted for 18.8% of all sampled students. Districts following either of these two sampling procedures sent parent consent forms prepared by SRI to the families. Families who wished to participate returned completed consent forms to SRI. Only 30% of selected families chose to complete the consent forms. SRI was not able to contact families that did not return the consent form to pursue follow-up activities, resulting in a much lower participation rate from families in these districts than from families in other districts.

Refusals to participate by the initial sample of 450 districts were much higher than anticipated on the basis of the survey of 1,600 districts described previously. We had hoped to solicit 400 participating districts from the sample of 450. Several months after the roster and student sampling processes began, 132 districts had refused to participate. Project staff determined that a replacement sample of districts would be needed to generate a sample of students that was representative of students nationwide in each disability category and that was sufficient for analysis purposes. Another 178 districts were selected that were matched to refusing districts on each of the stratification variables in the district sampling frame. Initial contacts to these districts began in January 1986, using the same follow-up procedures for this group as for the first group of districts.

Many youth in the deaf and visually impaired categories attend state-operated schools for the deaf and blind and did not appear on the rosters of sampled districts. To obtain the needed representative sample of youth in these categories, we defined an additional stratum consisting of all 84 state-operated schools for the deaf and blind, and selected all schools in this stratum. This expanded the universe to include all LEAs and state-operated schools for the deaf and blind serving secondary special education

students.* We used the same contact and follow-up procedures for state-operated schools as for the first group of districts.

Contacts to districts and state-operated schools about obtaining student roster information continued through June 1986. When the student sample was selected from the roster, we sent a list of the selected students and requested that the district or state-operated school provide parent names, addresses, and home telephone numbers so that we could contact the families to request their consent to participate in the study. Most districts that would not provide the students' names agreed to send the parents material provided by SRI to elicit participation. This material included a letter explaining the purpose of the study and briefly how the youth were selected, a form requesting the parent's name, address, and telephone number, and a postage-paid envelope. A handful of districts dropped out of the study at this point because they did not provide parent names, nor would they agree to send the parent materials themselves.

Table 2 summarizes the results of efforts to gain rosters of special education students from districts and special schools. Of the 628 sampled districts and 84 sampled state-operated schools, 303 districts and 22 state-operated schools supplied rosters. Eleven state-operated schools and 174 districts refused to participate. Concerns of staff burden in providing student rosters and other information for the study and concerns about student privacy were the two most commonly cited reasons for refusals. Staff in the remaining districts and state-operated schools agreed to participate and said they would provide a roster, but despite numerous reminder telephone calls over many months, the rosters were never sent. Thus, approval of the study did not always mean participation in the study.

Table 2
RESULTS OF REQUESTS FOR STUDENT ROSTERS

Sample Type	Sampled	Provided Roster[a]	Direct Refusal	Indirect Refusal[b]	Participation Rate[c]
Original LEAs	450	226	132	92	50.2%
Replacement LEAs	178	77	42	59	43.3
Total LEAs	628	303	174	151	48.2
State-operated schools	84	22	11	51	26.2

[a] Includes districts and special schools that sampled students themselves without actually providing a roster to SRI.

[b] Indirect refusals include districts and special schools that agreed to participate but did not provide rosters.

[c] Participation rate shown in this table excludes first-stage LEA refusals. Overall participation rate for combined original and replacement LEAs including first-stage refusals was 45.2%. Overall participation rate for special schools was 26.2%.

* Although the supplemental sample was selected to obtain youth in the deaf and visually impaired categories, a small number of youth in the deaf/blind, multiply handicapped, and hard of hearing categories were also attending the state-operated schools and were included in the sample.

Assessing Potential Nonresponse Bias in the LEA Sample

Given the fairly low response rate of districts and state-operated schools, SRI was concerned that bias would be introduced into the sample if nonparticipating districts were systematically different from participating districts in ways that could affect the topics under study. The amount of bias was estimated by comparing telephone survey responses of the 1,450 first-stage sample respondents and demographic data on these districts available from NCES and QED with data for the 303 respondents to the second-stage sample of LEAs (for whom nonresponse bias is a concern).

The following variables from the telephone survey of the first-stage sample were used to examine bias:

- ***Disabilities served.*** Whether the LEA served learning disabled, mentally retarded, speech impaired, orthopedically impaired, emotionally disturbed, hard of hearing, deaf, visually impaired, deaf and blind, multiply handicapped, or other health impaired students.

- ***Number of special education students.*** Whether the LEA served fewer than 10, 11 to 50, 51 to 100, 101 to 500, or more than 500 special education students. (Approximately 1% of the LEAs could not provide this information.)

- ***Vocational rehabilitation (VR) participation.*** Whether the LEA had few, some, or most of its special education students participating in VR.

- ***School-based resources.*** An index of the amount of school-based resources available for special education students, defined on the basis of the availability of school vocational programs and placement personnel, variety of settings for serving learning disabled and mildly mentally retarded students, and existence of transitional programs and occupational and physical therapy services.

- ***Community resources.*** An index of the amount of non-school-based resources available for special education students, based on the proximity and quality of community services and employment opportunities for youth with disabilities.

- ***LEA configuration.*** Whether the LEA's special education students were served by (1) a city office or special education district (i.e., an "up" configuration), (2) neighboring school districts (i.e., an "across" configuration), (3) state-operated schools, private day-care or residential schools, developmental disability institutes, mental health institutes, or other organizations serving special education students (i.e., an "out" configuration), or (4) entirely by the LEA itself. Note that the mutually exclusive categories are (1) "up (only)," (2) "across (only)," (3) "up and across," (4) "out," and (5) "in house."

- ***Metropolitan status.*** Whether the LEA was in an urban, suburban, or rural area.

- ***Percentage minority students in LEA.*** Percentage of the total student population in the LEA that was minority.

- ***Grades served.*** Whether the LEA served grades kindergarten through 8, kindergarten through 12, or secondary students only.

- ***Age limit on services.*** Whether the state-determined age limit on services was 18 or an age greater than 18.

Table 3 compares the population values as estimated using the 1,450 respondents to the first-stage sample of LEAs and the 303 respondents to the second-stage sample of LEAs. All estimates are weighted to the universe of 13,180 LEAs. Three measures of bias are computed:

- The absolute bias, computed as the absolute value of the difference between the estimate of the population value derived from the first-stage sample (denoted X_P) and the estimate of the population value derived from the second-stage sample (denoted X_E).

- The relative bias, computed as the absolute bias divided by X_P.

- The Z-value of the bias, defined as the absolute bias divided by the standard deviation of the bias. In computing the standard deviation, we used the fact that the second-stage sample is a random subsample of the first-stage sample (within the sampling strata), and therefore the first-stage sample can be regarded as a known "universe" from which a sample was taken. The formula for the variance of the bias is as follows:

$$\frac{1}{N^2} \sum_{k=1}^{K} (N_k)^2 \frac{V_k}{m_k} \left(\frac{M_k - m_k}{M_k} \right)$$

where N = 13,180 is the total number of LEAs in the universe, k is an index for strata, there are K = 96 strata, M_k is the number of first-stage respondent LEAs in the *k*th stratum, m_k is the number of second-stage respondent LEAs in the *k*th stratum, N_k is the number of LEAs in the universe in the *k*th stratum, and V_k is the variance of the responses of the M_k first-stage respondents in the *k*th stratum.

Table 3

COMPARISON OF FIRST- AND SECOND-STAGE SAMPLE OF LEAS

Variable	X_P	SD_P	X_E	SD_E	$\lvert X_P - X_E \rvert$	$\lvert X_P - X_E \rvert / X_P$	Z
Types of students served							
Learning disabled	0.975	0.002	0.967	0.003	0.008	0.008	0.723
Mentally retarded	0.845	0.003	0.862	0.006	0.017	0.020	0.713
Speech impaired	0.831	0.004	0.808	0.008	0.024	0.028	0.931
Orthopedically impaired	0.526	0.004	0.572	0.010	0.045	0.086	1.456
Emotionally disturbed	0.725	0.004	0.732	0.009	0.007	0.009	0.230
Hard of hearing	0.537	0.004	0.534	0.010	0.003	0.005	0.093
Deaf	0.355	0.004	0.340	0.009	0.015	0.042	0.530
Visually impaired/blind	0.426	0.004	0.444	0.010	0.018	0.043	0.615
Deaf/blind	0.128	0.003	0.115	0.005	0.013	0.100	0.634
Multiply handicapped	0.511	0.004	0.508	0.010	0.003	0.006	0.094
Other health impaired	0.461	0.004	0.467	0.009	0.006	0.013	0.207
Number of special education students							
Fewer than 10	0.194	0.003	0.229	0.007	0.034	0.176	1.451
11 to 50	0.407	0.004	0.364	0.010	0.042	0.104	1.346
51 to 100	0.159	0.003	0.148	0.007	0.012	0.074	0.512
101 to 500	0.195	0.002	0.215	0.005	0.019	0.098	0.974
More than 500	0.036	0.001	0.044	0.001	0.008	0.225	1.239
Participation in vocational rehabilitation							
Few special education students	0.274	0.004	0.249	0.009	0.025	0.092	0.865
Some special education students	0.388	0.004	0.390	0.010	0.002	0.004	0.046
Most special education students	0.337	0.004	0.361	0.010	0.024	0.071	0.758
Sum of school resources							
Index value	3.796	0.015	3.852	0.032	0.056	0.015	0.512

Table 3 (concluded)
COMPARISON OF FIRST- AND SECOND-STAGE SAMPLE OF LEAS

Variable	X_P	SD_P	X_E	SD_E	$\lvert X_P - X_E \rvert$	$\lvert X_P - X_E \rvert / X_P$	Z
Sum of external resources							
Index value	0.830	0.007	0.827	0.016	0.003	0.004	0.060
LEA service configuration							
Up (city or special district)	0.279	0.004	0.284	0.010	0.005	0.018	0.168
Across (neighboring district)	0.157	0.003	0.152	0.007	0.005	0.032	0.203
Up and across	0.346	0.004	0.295	0.010	0.051	0.146	1.576
Out (state or private school)	0.152	0.003	0.188	0.009	0.036	0.239	1.511
In (in-house services)	0.067	0.002	0.082	0.006	0.014	0.214	0.820
Metropolitan status							
Urban	0.025	0.001	0.020	0.001	0.005	0.199	0.909
Suburban	0.340	0.004	0.309	0.008	0.031	0.091	1.120
Rural	0.636	0.004	0.672	0.008	0.036	0.056	1.301
Minority enrollment							
Fraction of total students	0.097	0.001	0.079	0.003	0.018	0.189	1.580
Grades served							
K to 8	0.139	0.003	0.095	0.005	0.045	0.320	1.945
K to 12	0.826	0.003	0.861	0.007	0.035	0.042	1.428
Secondary only	0.035	0.002	0.044	0.003	0.010	0.283	0.808
Upper age limit for services							
18 years old	0.115	0.003	0.080	0.004	0.035	0.304	1.644
More than 18 years old	0.885	0.003	0.920	0.004	0.035	0.040	1.644

In examining Table 3, we looked for variables for which all three bias indicators were large—an absolute bias of 0.05 or larger (for the variables whose responses are percentages), a relative bias of 0.15 or larger, and a Z value in excess of 1.96 (because the Z value is from a two-sided test, this is equivalent to requiring differences to be significant with 95% confidence). Relevant observations from Table 3 are as follows:

- The disabilities served by LEAs were accurately represented. The largest discrepancy was in percentage of LEAs serving orthopedically impaired students; there, the relative bias was only 8.6%.

- The number of special education students served by the LEAs was accurately represented. For example, 19.5% of LEAs were estimated to serve 101 to 500 special education students on the basis of the first-stage sample, compared with an estimate of 21.5% of LEAs based on the second-stage sample. The largest discrepancy is in the estimates of the percentage of LEAs serving 11 to 50 special education students; there the relative bias was only 10.5%.

- The extent to which special education students participated in vocational rehabilitation was accurately represented. The largest discrepancy was in the percentage of LEAs for which few special education students participated in VR; there the relative bias was only 9.2%.

- The resources provided by both the LEAs and the community were accurately represented, with less than a 2% relative bias in either population average.

- LEAs with "up and across" configurations were slightly underrepresented (i.e., they were estimated to be 34.6% of the universe using the first-stage sample, but were estimated to be only 29.5% of the universe using the second-stage sample). LEAs with "out" configurations were slightly overrepresented (6.7% using the first-stage sample versus 8.2% using the second-stage sample). Neither result was significant at the 95% confidence level, but they were almost significant at the 90% confidence level.

- Metropolitan status was accurately represented. The relative errors for suburban and rural status were less than 10%. Although the relative error for urban status was moderately large (19.9%), the absolute error was extremely small (0.5%).

- The second-stage sample was slightly biased toward LEAs with smaller minority enrollment (average minority enrollment was 9.7% using the first-stage sample versus 7.9% in the second-stage sample). This result was not significant at the 95% confidence level, but was almost significant at the 90% confidence level. (Note that in computing "average minority enrollment" large and small LEAs were counted equally, rather than being weighted by enrollment.)

- LEAs serving only grades kindergarten through 8 were underrepresented (13.9% using the first-stage sample versus 9.5% using the second-stage sample), and LEAs serving grades kindergarten through 12 were slightly overrepresented (82.6% using the first-stage sample versus 86.1% using the second-stage sample). These results were significant at 94.9% and 84.4% confidence levels, respectively. Several schools serving only grades

kindergarten through 8 refused to participate in the study because they considered themselves to be elementary districts and had few youth that fell into the age group included in the youth sample. As a result, the NLTS sample probably underestimates the number of students in grades 7 and 8 by approximately 4% or 5%.

- The percentage of LEAs offering services only to students age 18 or younger was slightly underrepresented (11.5% using the first-stage sample versus 8.0% using the second-stage sample). This result was not significant at the 95% confidence level but was significant at the 90% confidence level.

These results are encouraging, and it appears that the LEA participants in the study sample were not appreciably different from the LEAs from which they were sampled. As noted above, only one comparison was significantly different with approximately 95% confidence, for reasons that were unlikely to affect the study seriously (there being few secondary special education students in the nonresponding K-8 LEAs). A few other comparisons were significant at the 90% level, but not more than would be expected by chance (i.e., we expected four to five significant results at the 90% confidence level by chance alone).

STUDENT SAMPLE SELECTION AND ASSOCIATED DATA COLLECTION EFFORTS

The rosters of secondary special education students obtained from participating LEAs were used to select a sample of students for which a variety of data collection efforts were undertaken. This section describes the procedures used to select the student sample, locate parents or guardians, obtain parent/guardian telephone interviews, abstract data from school records, obtain data on school and community programs, and conduct an in-person survey of nonrespondents to the parent/guardian telephone survey.

Selecting the Special Education Student Sample

As intended by Congress, the NLTS examines youth with disabilities aged 13 and older who were special education students in 1985-86. The study is to provide reasonably accurate estimates of what happens to these youth, both overall and for each of the 11 federal disability categories. To achieve a sample capable of addressing overall and within-category analyses, a goal was set of a sample of 1,000 youth for each category (except 500 for the deaf/blind), totaling 10,500 for the entire sample. Assuming that perhaps as many as 25% would decline to participate in the study at the outset, an initial sample of about 14,000 youth was sought, or about 1,320 per condition and 675 for the deaf/blind. Moreover, using the limited data on attrition available from previous studies, this initial size was assumed to be sufficient to result in a final sample of 500 to 750 after 5 years.* This relatively large sample within disability category permits the examination of differences between subgroups (for example, of employment differences between males and females) that a smaller sample would be inadequate to address.

Using the rosters obtained from sampled LEAs, the student sample was stratified by disability category and age. For the first variable, the 11 federal definitions were used. Students were included in the category to which they were assigned by the district or state-operated school from which they were sampled in the 1985-86 school year. For LEAs that used categories other than the 11 federal categories, information on the disability of youth was used to reassign them to a federal category. This reassignment often entailed calling the state or the LEA in question to confirm the nature of the handicap to which their unique label was assigned. For example, the developmentally handicapped in Ohio were equivalent to the mentally retarded in the federal categorization and, accordingly, were considered to be mentally retarded for sampling purposes.

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* A sample of 500 completely randomly selected respondents is sufficient to estimate proportions to within a standard error of 2.2%. However, in a multi-stage sample such as was used in the NLTS, the effective sample size is typically 50% of the actual number of respondents, so a sample of 500 respondents would allow estimation of proportions to within a standard error of approximately 3.2%.

To ensure that sufficient numbers of youth in the sample would have an opportunity to move out of school and into adult life, three age categories were defined: 13 to 15, 16 to 18, and 19 and over (i.e., those born in 1970 through 1972, 1967 through 1969, and 1966 or earlier, respectively). Most of the first group would be in school for the majority of the study period, whereas the latter two would be mainly out of school. The 19-and-over group that was still in school was quite small and consisted of youth who were primarily moderately to severely handicapped. The 16-to-18 group was more varied on severity of handicap. The two student stratification variables (disability condition and age) resulted in 33 student strata within each respondent LEA.

Based on the estimates in OSEP's *8th Annual Report to Congress* of national distributions of youth by age and by disability category, sampling rates were calculated to yield the desired sample size in each disability category and about equal numbers of youth in the 13-to-15 and 16-to-18 age categories (approximately 40% of the sample in each of these categories) and approximately half this number in the 19-and-older category (i.e., 20% of the sample). These sampling rates were multiplied by the counts within each of the 33 student strata from each LEA roster to obtain the desired number of youth in each student stratum from each LEA. This number of students was then randomly selected from the relevant age group within each disability category from each roster. For example, if the sampling rate for students in large LEAs who were age 13 to 15 and classified as mentally retarded was 17%, and an LEA from the large stratum reported 36 youth in this age and disability category, then 6 13- to 15-year-old mentally retarded youth (i.e., 17% x 36) were sampled from that LEA. Midway through the sampling process, it became apparent that previously developed sampling fractions were insufficient to generate enough youth in some categories (e.g., speech impaired and other health impaired). Sampling fractions were doubled in these categories in the remaining LEAs to generate a larger pool of youth.

Locating Parents/Guardians

After the students were selected, an effort was launched to locate their parents or guardians. This was important for two reasons. First, the initial interview was to be with parents/guardians, rather than students. Second, as part of its overall effort to encourage districts to release educational information from student school records, SRI wanted to obtain written permission to access these records from as many parents/guardians of selected students as possible.

For parents/guardians in all but 32 school districts where confidentiality concerns prohibited staff from giving us a list of names of special education students from which to sample, SRI tried to locate parents/guardians directly using the addresses and telephone numbers provided by the districts. In these cases, the initial parent contact involved a letter explaining the study and informing parents that they would be called for

an interview. A consent form was included with the letter giving permission for SRI to gain access to school records. A postcard was included for parents to use in informing SRI of their current address and telephone number. Repeated follow-up mailings and telephone calls were made to nonrespondents.

In the 32 school districts where confidentiality concerns prohibited district staff from giving us a list of names of special education students from which to sample, the district sent participation requests to the families. Parents/guardians from these districts who did not return the consent form were lost from the sample.

Table 4 presents the results of our efforts to locate parents/guardians. Of the 12,833 students selected for the sample, 1,632 were nonparticipants in the study because their names were never revealed by the districts from which they were sampled and parents did not return a consent form. The address information for 636 youth was found to be incorrect, with no forwarding address available from the post office and no working telephone number available to call the family to request new address information. Parents reported the deaths of 43 students selected for the sample. Thus, parents/guardians of 10,369 youth were available for interview.

Of the 10,369 parents/guardians available for interview, 4,493 provided written permission to access school records, and an additional 1,301 provided verbal consent. A small percentage refused consent either verbally or in writing; the remainder did not respond. However, SRI tried to obtain telephone interviews from all parents/guardians whether or not consent forms were obtained, except for students in LEAs that prohibited us from contacting any parents who had not returned a consent form for access to school records.

Table 4
RESULTS OF EFFORTS TO LOCATE PARENTS/GUARDIANS

Response to Efforts	Number
Desired sample	12,833
No location information provided by school district and consent form not returned by parent/guardian	1,632
Inaccurate location information; unable to locate by mail or telephone	636
Youth deceased	43
Available for interview	10,369 [a]

[a] Excluding the 43 deceased youth, the rate for efforts to locate parent/guardians is 10,369 / 12,780 = 81.1%. Table 6 provides a breakdown of the numbers in Table 4 by disability group.

Fortunately, an unwillingness to return a signed consent form did not imply an unwillingness to participate in the study. A large number of parents who did not return a form completed the interview. Also, more than half of those who had initially refused to participate altogether also granted the interview. Consent forms were also not required for access to records in most school districts, although our ability to attest to requesting written consent eased entry in many LEAs and schools.

Obtaining Parent/Guardian Telephone Interviews

A major component of the NLTS involved interviewing by telephone the parents or guardians of youth in the sample. Because the questionnaire was too complex to be administered from a hard-copy format, computer-assisted telephone interviewing (CATI) was employed by SRI's telephone interview subcontractor, Chilton Research Services (CRS). The majority of these interviews were conducted between June 22 and September 15, 1987, although a reduced level of interviewing continued through November 8, 1987. These interviews averaged 26 minutes in length.

Before the telephone interviewing began, we sent letters to parents/guardians of sample members to inform them that soon they would be contacted for interviews. A postcard was included with each contact letter for parents to use in informing us of any change to their current address and telephone number.

About 1,600 postcards were returned. For about 700 youth, letters were returned by the post office with a forwarding address indicated, or a telephone call to the parent resulted in obtaining a new address. About 300 youth were lost to the sample because the contact letter was returned with no new address and no telephone number could be found to contact the parent. New addresses were obtained for about 800 youth and new telephone numbers for about 650 youth.

Because a major priority of the study was to maximize the number of youth about whom interviews were completed, an unlimited call rule was implemented. Interviewers made repeated attempts to locate each parent/guardian through the entire period of data collection, rotating the contact attempts through various days of the week and times of day.

Many youth were lost to the sample because they were no longer at the address or telephone number we had or because we had never had a telephone number for them. The following efforts were undertaken to complete interviews for these youth:

- ***Use of directory assistance.*** For many youth, no telephone number was provided by the LEA or school from which they were selected. For others, initial mailings or telephone contact attempts revealed that the numbers we had were no longer in service or did not reach the desired respondents. In such

cases, interviewers used directory assistance in an effort to locate a working telephone number. This process was not as successful as hoped because LEAs often also did not provide the name of the youth's parents. Because parent and youth names often differ, asking directory assistance for a telephone number associated with the youth's last name at the last known address often did not result in finding the needed number.

- ***Contacts with LEAs and schools.*** In September 1987, toward the end of the interview period, the names of all youth for whom addresses or telephone numbers were missing or inaccurate were sent to the LEAs or schools from which they had been selected. LEAs and schools were asked to provide current information if it was available. If youth were no longer in the district or school, they were asked to provide any available information on the youth that could assist in finding them (e.g., the name of the district to which the youth had transferred). More than 200 districts received these requests; about two-thirds responded, providing telephone numbers for 27% of the youth who previously had been lost to the sample.

- ***Toll-free telephone number.*** For approximately 1,100 youth, no telephone number had been provided by the LEA from which they were selected and no postcard had been returned by the parent indicating a telephone number. Because this was such a large proportion of the total sample, several extra efforts were undertaken to enable telephone interviews to be completed with them. A postcard was sent to all parents for whom we had no telephone number that provided them with a toll-free 800 number and encouraged them to call for an interview. A second postcard was sent after about 3 weeks reiterating that their participation was important and encouraging them to call. Despite these efforts, only 43 interviews were completed by parents initiating the interview via the toll-free number.

- ***Mail questionnaire.*** In a further effort to reach the parents of youth for whom we believed we had a correct address but no telephone number or an inaccurate telephone number, we developed a one-page mail questionnaire that contained items related to key outcome variables (e.g., whether the youth had completed secondary school, had a job). At the bottom of the questionnaire was a space for the parents to indicate their current address and telephone number. This was mailed late in the interview period to 2,150 parents of youth for whom no telephone interview had been completed. Completed questionnaires were returned by 323 parents, with about 75% containing a new telephone number. Telephone interviewers attempted to contact the parents, thanked them for the mailed questionnaire, and completed the telephone interview. This process resulted in an additional 121 completed telephone interviews. For others, the data from the mailed questionnaires were entered into the database as incomplete interviews.

Table 5 summarizes results of the parent/guardian interviews. Of the 10,369 youth for whom interviews with parents/guardians were attempted, interviews were completed for 62%,* including 280 interviews completed in Spanish. Partial telephone interviews were achieved for 2%, and for another 2%, partial information was obtained through the

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* Excluding deceased youth, the overall response rate for locating the parent/guardian and completing the telephone interview is 6,438 / 12,790 = 50.3%.

Table 5
RESULTS OF PARENT/GUARDIAN INTERVIEWS

		Primary Disability Category										
	Total	Learning Disabled	Emotionally Disturbed	Speech Impaired	Mentally Retarded	Visually Impaired	Hard of Hearing	Deaf	Orthope-dically Impaired	Other Health Impaired	Multiply Handicapped	Deaf/ Blind
Counts												
Telephone interview completed	6438	888	575	421	829	706	625	750	599	383	574	88
Partial telephone interview	220	36	20	25	29	18	15	22	19	17	16	3
Mail questionnaire returned and no telephone interview	194	18	20	11	42	16	11	19	20	7	26	4
Respondent refused	332	61	47	18	44	25	27	22	38	24	23	3
Language barrier (not Spanish)	65	5	4	9	5	3	13	12	7	5	2	0
No adult could respond about youth	187	23	25	20	29	20	12	22	7	10	17	2
Nonworking telephone number; parent would not call toll-free	2004	283	206	175	368	200	195	158	165	112	120	22
Telephone never answered	874	88	86	60	131	82	102	111	68	54	81	11
Other disposition	55	3	3	5	6	2	7	14	2	5	5	3
Total	10369	1405	986	744	1483	1072	1007	1130	925	617	864	136
Percent of total												
Telephone interview completed	62	63	58	57	56	66	62	66	65	62	66	65
Partial telephone interview	2	3	2	3	2	2	1	2	2	3	2	2
Mail questionnaire returned and no telephone interview	2	1	2	1	3	1	1	2	2	1	3	3
Respondent refused	3	4	5	2	3	2	3	2	4	4	3	2
Language barrier (not Spanish)	1	0	0	1	0	0	1	1	1	1	0	0
No adult could respond about youth	2	2	3	3	2	2	1	2	1	2	2	1
Nonworking telephone number; parent would not call toll-free	19	20	21	24	25	19	19	14	18	18	14	16
Telephone never answered	8	6	9	8	9	8	10	10	7	9	9	8
Other disposition	1	0	0	1	0	0	1	1	0	1	1	2
Total	100	100	100	100	100	100	100	100	100	100	100	100

one-page mail survey. Refusals were only 3% of the sample. For 2%, no respondent was available, and in 1% of cases, a language barrier other than Spanish resulted in a failure to complete the interview. For 19% of the sample, no correct telephone number was located for the sample member, and in the remaining cases, repeated attempts to reach the respondent throughout the interview period never reached a respondent at the telephone number we had. There was little variation in response rates among the disability categories of the youth. The largest variation occurred for the percentage with complete telephone interviews, which ranged from a low of 56% for youth in the mentally retarded category to a high of 66% for youth in the orthopedically impaired, visually impaired, and multiply handicapped categories. The second-largest variation occurred for the percentage of youth without telephone numbers whose parents would not call toll-free, which ranged from a low of 14% for the deaf and multiply handicapped to a high of 25% for the mentally retarded.

Abstracting Data from School Records

One important focus of the NLTS is to describe the school programs of secondary students with disabilities. Information was needed regarding courses youth took; the settings in which they were served; performance indicators, such as grades and minimum competency test outcomes; absenteeism; and supplementary services the youth may have received from the school, such as speech therapy or personal counseling. Because parents are often not fully aware of these aspects of students' programs in sufficient detail for study needs, a process of gathering information from students' school records was incorporated into the NLTS. Field test experience suggested that recruiting local school staff to provide the information from the school records would result in more accurate information at lower cost than would be obtained if SRI field staff were used in the hundreds of schools attended by sample youth in the 1985-86 or 1986-87 school year.

The student sample contains youth whose most recent year in secondary school was either the 1986-87 or the 1985-86 school year. The procedures for identifying the schools most recently attended differed, depending on the school year in which the youth were most recently enrolled in secondary school.

Identifying Schools Youth Attended in 1986-87—After determining in the parent/guardian telephone interview that the youth had been enrolled in secondary school in the 1986-87 school year, the parent was asked to identify the name and location of the most recent secondary school the youth attended. In many cases, the parent did not provide enough information to allow the school to be unambiguously identified. Several steps were taken to clarify incomplete or inaccurate school names and addresses. These steps included the use of Market Data Retrieval's school guide and the Curriculum Information Center's *State Guides for School Year 1986-1987*, use of

directory assistance, and contacting LEAs from which students were sampled. In fewer than 2% of the cases, the school name given by the parent in the interview could not be linked to any identifiable school.

Identifying Schools Youth Attended in 1985-86—Parents who said youth were not enrolled in secondary school in the 1986-87 school year were not asked what schools the youth had attended previously, because the original study design did not call for collecting student record or school survey information for those students. However, in the course of interviewing parents, a design change resulted in the need to collect this information for all youth for their most recent school year. To identify the secondary school attended in 1985-86 by youth who were not in school in 1986-87, we reviewed the roster of students from which the youth had originally been sampled; in many cases, these listed the school in which the youth was enrolled that year. For youth for whom the 1985-86 school was not listed on the roster, we asked the record abstractor recruited for that district to search district records to identify the school the youth had attended.

At the conclusion of these efforts, special education students selected from the 303 participating districts and 22 participating state-operated schools were found to be attending a total of 1,810 schools, 400 of which were outside the original sample of districts and state-operated schools.

In the fall of 1987, our contacts in each district/school from which youth were sampled were asked to review a list of schools parents reported as attended by sample youth and to verify the school address information. A list of sampled youth enrolled in secondary school for whom no school had been identified was also sent with a request for the contact person to supply the name and location information of the school attended by each student. Contacts were also asked to identify an abstractor (or several abstractors) who would be willing and qualified to collect student record information for students in the sample (abstractors were paid $6.50 per completed abstract). We also included an updated version of a letter from the U.S. Department of Education, office of the Family Educational Rights and Privacy Act (FERPA), stating that for the purposes of this study, educational agencies could release student information to SRI without violating federal law.

Follow-up procedures involving reminder letters and calls were made to about 90% of the districts/state-operated schools. The telephone calls were very important in assuaging district and school staff concerns about participation. Their two primary concerns were:

- ***Confidentiality of student records.*** In the majority of cases, the FERPA letter was sufficient for collecting student record information. The FERPA letter did not satisfy the concerns of 19 districts and 3 state-operated schools; in these cases, we sent copies of the signed parent consent forms that were available. Because we did not have parent consent forms for all students, the consent

form requirement reduced the response rate for the record abstracts from these districts/schools.

- ***Burden on district/school staff.*** We discussed with district personnel how student record abstract data could feasibly be collected in that district. District staff were encouraged to use as many abstractors as they thought necessary to reduce the burden on any one staff member.

As mentioned earlier, approximately 400 schools outside the original sample were identified as serving students in the sample in the 1986-87 school year. Recruitment of these schools paralleled recruitment of schools in the original sample, except that the principals of these schools were contacted directly to recommend an abstractor.

Abstractors were recruited in 95% of the original participating districts, 100% of the original participating state-operated schools, and 80% of the schools not in the original sample of districts. In the majority of districts and schools in which an abstractor was not identified, staff did not explicitly refuse to participate; however, they failed to identify someone who would serve as an abstractor after repeated requests.

After repeated reminder mailings and telephone calls, Student Record Abstract Forms were returned for 6,241 students, a 60.2% response rate of the 10,369 students whose parents/guardians could be located and a 48.8% response rate of the 12,790 originally selected parents/guardians (excluding deceased youth).

The School Program Survey

The Survey of Secondary Special Education Programs was designed to collect information about each youth's secondary school, as well as information about the community in which the school was located. Section A of the survey contained background items concerning the school's students and staffing, and instructions stated that this section was best completed by someone with a schoolwide perspective. The remainder focused on the school's special education programs, and instructions stated that this section was best completed by someone with a good day-to-day knowledge of these programs (usually a special education staff member). The survey instrument was mailed to the school principal.

The process for contacting both original districts/schools from which youth were sampled and new schools to which youth had moved since the sample was selected was similar to that used to establish contact for abstracting information from school records. Follow-up procedures included postcards, letters, and telephone calls. In addition, a telephone version of Section A of the school survey was developed, and schools that had not returned a completed mail survey were contacted by telephone.

Of the 1,810 correctly mailed school questionnaires, 1,432 (79%) were completed and returned. (An additional 101 questionnaires had been incorrectly mailed, either to schools where there were no sample students attending in 1986-87 or to schools that were not secondary schools.) Of the 378 schools that either refused or never returned a completed school questionnaire, partial school background information was collected by telephone for 304 schools. In total, these data provided complete school program survey information for 5,811 youth who attended school in 1986-87 and partial information for 861 youth who attended school in 1986-87. In addition, our sample included 957 youth who had last attended in 1985-86 one of the schools that had completed the school program survey for 1986-87. Under the assumption that school programs had not changed substantially from 1985-86 to 1986-87, we imputed the 1986-87 school program survey data to these 957 youth.

The Nonresponse Survey

Of the 12,833 students selected for the sample, 6,658 parent/guardian telephone interviews were completed or partially completed. This relatively low response rate (51.9%) raised the issue of whether those for whom we had completed or partially completed telephone interviews were representative of the special education population to which the study was intended to generalize. To determine whether bias existed, SRI subcontracted with the Research Triangle Institute (RTI) to locate and conduct in-person interviews with a subsample of parents/guardians who did not complete the telephone interviews. By comparing data from the in-person interviews with data from telephone interviews, we could identify whether the telephone interview nonrespondents differed systematically from telephone interview respondents. As discussed later, in performing the weighting, we combined the responses to the in-person parent/guardian survey with the responses to the telephone parent/guardian survey, and used knowledge of the differences between the surveys to modify the weights.

Design

Not all of the 6,175 youth whose parents/guardians did not complete the parent interview were eligible for participation in the nonresponse survey. The ineligible youth included the following:

- Youth whose names were not revealed by the school district and whose parents/guardians never returned consent forms.
- Youth for whom address information was found to be incorrect, with no forwarding information available from the post office and no working telephone number available to call the family to request new address information.

- Youth who were deceased.
- Youth whose parents/guardians actively refused to participate in the telephone survey.
- Youth for whom there was a language barrier other than Spanish.
- Youth for whom there was no adult who could respond about the youth.
- Youth in institutions.
- Youth in the deaf/blind disability condition.

In addition, the nonresponse survey could not address the representativeness of youth from school districts that did not participate in the NLTS.

Excluding the ineligible youth, there remained approximately 3,000 youth who were eligible for the nonresponse survey. These youth could be classified into one of four groups:

- Youth for whom the address appeared to be correct, but the telephone number was incorrect; i.e., it did not work or did not reach the desired parent/guardian.
- Youth for whom the address appeared to be correct, but there was no telephone number.
- Youth for whom the address and telephone number both were incorrect.
- Youth for whom the address and telephone number both appeared to be correct, but no one answered the telephone in repeated attempts over the several months of the telephone interview period.

These four groups constituted approximately 31%, 27%, 21%, and 20% of eligible respondents, respectively.

The nonresponse survey sample design was a two-stage cluster sample. In the first stage, LEAs (but not state-operated schools) were selected with probability proportional to the number of nonrespondents in the LEA. This sampling procedure tended to yield larger districts, which maximized the efficiency of in-person contact. The first-stage sample yielded 27 LEAs with a total of 1,608 nonrespondents. The second-stage sample of students was selected from these 27 LEAs with probability proportional to first-stage weights, so that nonresponding students had approximately equal probabilities of selection overall. The second-stage sample resulted in a total sample of 554 youth in the nonresponse survey.

Instrumentation

The parent/guardian telephone survey questionnaire was adapted for use in an in-person interview. The contents of the telephone and in-person questionnaires were very similar; changes largely were related to questionnaire format. Interviews lasted approximately 25 minutes.

Procedures for Locating Nonrespondents

Interviewers were supplied with key information on each sample member to assist in completing an interview. Key information included the youth's name, the parent/guardian's name, last known address and telephone number(s) of the parent/guardian, last known school attended by the youth, the disability category of the youth, the youth's age, reasons for nonresponse (e.g., no telephone number, bad address and telephone, nonworking number, etc.), and whether a written consent form or mail questionnaire had already been returned.

As a first step in locating respondents, interviewers visited the last known address of the youth. Three call-backs were attempted at the home address, if the interviewer believed the address was correct but no one was at home. If the interviewer believed the address was incorrect, neighbors were contacted to attempt to obtain information regarding the new location of the sample youth.

The school last attended by the sample member was also used as a source of information in locating a parent/guardian. Interviewers visited the school, explained the nature of the study, indicated that they had spoken with the district-level contact person, and requested help in finding an address or telephone number for the student.

New location information was sometimes known by school personnel, often by pulling the student's file. School personnel were also sometimes able to provide other types of information that could be useful in locating parents/guardians. For example, school personnel were asked whether they knew of any other agency that provided service to the student (e.g., the Department of Mental Health, a job training center, etc.); the name of a new town or district to which the sample member had moved (a request for a transcript from a new district was often a source of this information); the name of another school in the district in which the student had enrolled after leaving this school; the name of any siblings in the school (the files of siblings sometimes contained a correct address or telephone number); if the student was not still enrolled, whether the student had graduated, dropped out, or aged out; the name of the parent's or the student's employer while the student was enrolled in school; the names of friends of the student who might know where he/she was; and the names of teachers in the school who might know the whereabouts of the sample member. The interviewer initiated

telephone calls to all agencies, schools, employers, friends, and teachers whose names were provided by the school in an attempt to locate the parent/guardian of the sample member.

If the school could not provide helpful information, other sources of information were used, including the local post office, small businesses in the neighborhood where the family might be known, city directories, and Polk directories (which list the residents of a city by address and were used to obtain the names and telephone numbers of neighbors near the subject's last known residence).

Response Rate

Of the 554 nonrespondents included in the nonresponse substudy sample, interviews were completed with 441, for a completion rate of 80%. The process revealed that the majority of sample members actually lived at the addresses contained in the SRI file but had either no telephones or unlisted numbers, or SRI had not been given their number by the original school district.

Contents of the Combined Database

Data from the several components of the NLTS were combined into a single database for analyses, using the unique student identification number to connect data for each student from the parent interview (telephone and in-person), record abstract, and school survey with the original sample file. Although the response rate for each data collection component was reasonably high, complete data from all three components were obtained for a smaller percentage of sample members. Table 6 indicates the percentage of youth in each federal disability category for whom various combinations of data were obtained.

Data from at least one source were obtained for 8,678 youth, 84% of the sample of living youth for whom we ever had location information. However, complete data were obtained from the parent interview, school records, and the school survey for only 4,064 (39% of youth available for contact). Data availability is fairly uniform across the disability categories, ranging from 34% of youth in the emotionally disturbed category to 42% of youth in the visually impaired category having complete data. As discussed later, weights were computed for 8,404 respondents who had at least a completed (or almost completed) parent/guardian interview or a school record abstract. These 8,404 respondents were used in wave 1 analyses.

Table 6
STUDENT SAMPLE BY HANDICAPPING CONDITION

Status	Total	Learning Disabled	Emotionally Disturbed	Speech Impaired	Mentally Retarded	Visually Impaired	Hard of Hearing	Deaf	Orthopedically Impaired	Other Health Impaired	Multiply Handicapped	Deaf/ Blind
Number of youth sampled	12833	1650	1321	893	1642	1318	1372	1275	1060	1005	1132	165
No further contact possible												
Unable to locate	636	71	70	48	97	64	87	55	54	37	47	6
Names not provided by LEA	1632	206	271	52	55	120	197	139	18	362	212	0
Deceased	43	3	0	1	5	2	4	0	14	7	4	3
Total	2311	280	341	101	157	186	288	194	86	406	263	9
Total available for interview	10369	1370	980	792	1485	1132	1072	940	974	599	869	156
In database												
Youth with any data	8678	1210	814	603	1249	904	784	940	791	499	771	113
(% of youth available)	84	88	83	76	84	80	73	100	81	83	89	72
Completed parent interview[a]	6879	935	617	464	900	736	673	779	652	419	616	88
(% of youth available)	66	68	63	59	61	65	63	83	67	70	71	56
Record abstracts	6241	895	557	422	933	652	564	714	560	305	561	78
(% of youth available)	60	65	57	53	63	58	53	76	57	51	65	50
Completed school surveys	5811	829	500	418	787	652	504	706	535	306	497	77
(% of youth available)	56	61	51	53	53	58	47	75	55	51	57	49
Partial parent data[b]	740	108	92	62	119	57	44	62	72	40	71	13
(% of youth available)	7	8	9	8	8	5	4	7	7	7	8	8
Partial school survey[c]	861	107	71	55	141	90	112	67	57	67	78	16
(% of youth available)	8	8	7	7	9	8	10	7	6	11	9	10
Complete data[d]	4064	653	334	265	520	470	370	530	400	212	341	59
(% of youth available)	39	41	34	33	35	42	35	56	41	35	39	38
Sufficent data for weighting[e]	8404	1190	779	587	1204	874	770	918	763	475	744	100
(% of youth available)	81	87	79	74	81	77	72	98	78	79	86	64

a Includes in-person and telephone interviews.

b Includes partial telephone interviews, mail questionnaire, and additional items of data obtained from rosters.

c Includes telephone interview of only part A of the school survey.

d Completed interviews for the parent/guardian survey, school record abstract survey, and school program survey (parts A and B).

e Youth who were weighted had a parent interview (completed or, in 255 cases, almost completed) or a record abstract.

Table 6
STUDENT SAMPLE BY HANDICAPPING CONDITION (concluded)

Status	Total	Learning Disabled	Emotionally Disturbed	Speech Impaired	Mentally Retarded	Visually Impaired	Hard of Hearing	Deaf	Orthopedically Impaired	Other Health Impaired	Multiply Handicapped	Deaf/ Blind
Sufficent data for weighting	8404	1190	779	587	1204	874	770	918	763	475	744	100
Among weighted respondents												
Parent interview only	1190	165	119	81	158	92	119	125	130	86	106	9
Parent and record abstract only	212	32	32	14	46	7	11	9	21	14	25	1
Parent and school program only	989	131	103	86	111	134	88	79	75	83	80	19
Record abstract only	223	39	40	15	52	14	11	10	18	7	17	0
Record abstract and school program only	1047	170	94	80	219	106	69	104	72	29	91	13
Parent interview, record abstract and school program	4743	653	391	311	618	521	472	591	447	256	425	58
Total parent interviews	7134	981	645	492	933	754	690	804	673	439	636	87
Total record abstracts	6225	894	557	420	935	648	563	714	558	306	558	72
Total school programs	6779	954	588	477	948	761	629	774	594	368	596	90

NONRESPONSE BIAS IN DATA COLLECTION EFFORTS

In this section, we examine nonresponse bias in the telephone survey, the school record abstracts, and the school program survey. We also examine item nonresponse.

Comparison of the In-Person and Telephone Interviews

The in-person and telephone interviews were compared to better understand the differences between telephone interview respondents and those individuals who could not be located for the telephone interview but could be located for the in-person interview and consented to be interviewed. There were three complicating factors in making this comparison. The first complicating factor was the bias of the in-person interview toward very large school districts. For example, approximately 58% of the in-person respondents came from huge districts and only 14% from medium and smaller districts, whereas approximately 30% of the telephone survey respondents came from huge districts and 24% from medium or smaller districts. The second complicating factor was the different allocations of the in-person and telephone respondents among disability categories. These different proportions resulted partly from random chance and partly from not having any youth attending state-operated schools in the deaf, deaf/blind, and visually impaired disability categories in the nonresponse survey. For example, youth in the deaf, visually impaired, and deaf/blind disability categories accounted for only 13.4% of respondents to the in-person interview but 23.6% of respondents to the telephone survey. The third complicating factor was that interviewing methods were different, so that differences between in-person and telephone results may not be attributable exclusively to nonresponse bias. As described below, we were able to adjust for the first and second complicating factors, but not for the third.

To make the respondents to the in-person interview and the telephone interview comparable with respect to LEA size and disability category, the data were weighted.* Our first choice was to weight each data set to represent the appropriate universe of special education students. However, the 442 in-person respondents were sparsely and disproportionately distributed among the possible 3,168 student strata.**

Even when we performed extensive strata collapsing (as described below), which would have allowed such weights to be calculated, the effect would have been to reduce

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* The weighting procedures used to compare the in-person and telephone interviews should not be confused with the procedures used to weight the combined database, consisting of in-person and telephone parent interviews, school record abstract respondents, and school program survey respondents. The procedures used to weight the combined database are discussed later in the report.

** There were 96 LEA strata (defined by the intersection of 4 geographic regions, 6 sizes, and 4 wealth ranges) multiplied by 33 youth strata (defined by the intersection of 3 age groups and 11 handicapping conditions) for a total of 3,168 strata.

the effective sample size* for the in-person survey to only about 100 respondents. Hence, we weighted the telephone survey respondents to be comparable to the in-person survey respondents via the following weighting process:

- On the basis of an analysis of the telephone survey (described later), the 3,168 original strata were collapsed. The small and very small district size strata, the two lowest wealth strata, the two highest wealth strata, and the four geographic regions were collapsed. This resulted in 330 strata defined by LEA size (5 levels), LEA wealth (2 levels), disability category (11 levels), and youth's age (3 levels).

- The respondents to the in-person and telephone interviews were classified into the 330 strata. Youth sampled from state-operated schools for the deaf and blind were excluded from these strata.

- The telephone interview respondents were weighted to the number of in-person interview respondents in each of the 330 strata. For example, there were 62 telephone interview respondents and 12 in-person interview respondents among youth classified as learning disabled, born in 1970 through 1972, and attending huge and wealthy LEAs. Each of the 62 telephone interview respondents was given a weight of 12/62 = 0.194 and each of the 12 in-person interview respondents was given a weight of 1.0.

The first two columns of numbers in Table 7 compare the characteristics of respondents to the in-person interview with those of respondents to the telephone interview using the weighting procedure described above. (The last column is described later in this section and allows a comparison using another weighting procedure.) The youth for whom parents/guardians responded to the in-person interview were more likely to be black, Hispanic, American Indian, or Alaskan native (64% in the in-person interview vs. 48% in the telephone interview), more likely to live in a one-parent household (54% vs. 40%), more likely to come from a household in which the head of household was a high school dropout (57% vs. 39%), less likely to come from a household in which the head of household had at least some college education (14% vs. 27%), more likely to come from a household with an income of less than $12,000 per year (56% vs. 29%), less likely to come from a household with an income of at least $25,000 per year (8% vs. 40%), less likely to be currently enrolled in school (55% vs. 67%), less likely to have graduated (50% vs. 71%), and more likely to have dropped out (42% vs. 19%). The graduation and dropout rates were both computed using a base of those no longer in school. For purposes of this comparison, dropouts were students who were on the school roster in 1985-86 but by the 1987 interview their parents reported that they were

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* The precision of sample estimates is a function of the sample size and sampling weights. Precision increases when the sample size increases and tends to decrease when the variance of the sampling weights increases. The effective sample size is the number of completely randomly selected respondents (i.e., selected without stratification) required to achieve the same precision as that available with stratified (and differentially weighted) respondents.

Table 7
COMPARISON OF IN-PERSON AND TELEPHONE RESPONSES TO THE PARENT/GUARDIAN QUESTIONNAIRE

Response to Questionnaire	In Person Survey	Telephone Survey[a]	Income-Adjusted Telephone Survey[b]
Percentage of youth:			
Male	58	61	62
Lives with parent	80	88	86
Lives alone	2	1	1
Lives with spouse or roommate	2	2	2
Lives with family member or friend	5	3	4
Lives in residential or boarding school	1	2	2
Lives in a college dorm	0	0	0
Lives in military housing	0	0	0
Lives in a supervised group home	3	2	2
Lives in a hospital/medical facility/institution	4	0	0
Lives in a correctional facility	2	1	1
Black	43	32	40
White	33	49	39
Hispanic	21	15	18
American Indian or Alaskan Native	0	1	1
Asian	2	2	2
Youth now enrolled in school	55	67	67
Graduated	50	71	69
Dropped out	42	19	22
Temporarily suspended	3	1	1
Permanently expelled	2	1	1
Older than age limit	3	8	6
Youth gets paid for work outside home, school	21	29	25
Any postsecondary education	19	20	17
Belonged to school or other group in last year	30	34	29
Lives in a one-parent household	54	40	54
Head of household education: 11th grade or less	57	39	50
Head of household education: high school diploma	28	32	31
Head of household education: < 4 years of college	12	16	13
Head of household education: 4-year degree or beyond	2	13	6
Head of household has a paid job now	57	69	56
Household income < $12,000	56	29	56
Household income ≥ $12,000 and < $25,000	36	31	36
Household income ≥ $25,000	8	40	8
Youth will be able to answer questions for self	69	75	75
Mean values on:			
Average hourly wage if paid ($)	3.63	3.81	3.70
Self-care ability scale	10.47	10.43	10.37
Functional mental skills scale	13.29	12.84	12.80
Household-care ability scale	10.91	10.10	9.78

[a] Telephone respondents weighted to distribution of in-person respondents by LEA size and wealth and youth handicap and age.

[b] Telephone respondents weighted by factors listed previously and by in-person respondent household wealth.

no longer in school, had not graduated, had not been expelled, and had not exceeded the age limit for enrollment.

We investigated whether further weighting of the telephone survey respondents could be used to minimize the differences between the telephone and in-person versions of the parent/guardian survey. The largest discrepancy between the two surveys was with respect to household income, and we hypothesized that all of the observed differences would be related to household income. Consequently, we redefined the strata into which respondents were entered by dividing each stratum into three substrata according to whether household income was less than $12,000 per year, between $12,000 and $24,999, or at least $25,000. This defined 990 strata. Otherwise, weighting was performed as described above. The in-person interview was unweighted, and the telephone interviews were weighted so that within each stratum they summed to the number of in-person interviews in that stratum. The effect on telephone survey responses of adding household income as a weighting variable is shown in the last column of Table 7. The income adjustment substantially improved the agreement between the two surveys for all the demographic variables. The proportion of black, Hispanic, American Indian, and Alaskan native youth in the reweighted telephone survey increased to 59% (vs. 64% for the in-person survey); the proportion of households in which the head of household was a high school dropout decreased to 50% (vs. 39%); and the proportion of households in which the head of household had at least some college education decreased to 19% (vs. 14%). Of course, after income weighting there were no remaining differences between the household income distributions of the in-person and telephone surveys. The income adjustment did not fully adjust for differences in the school status variables. The proportion of youth currently enrolled remained unchanged at 67% (vs. 55% among in-person respondents); the proportion of youth who had graduated among those no longer in school decreased only slightly to 69% (vs. 50%); and the proportion of youth who had dropped out among those no longer in school increased only slightly to 21% (vs. 42%).* We concluded that some, but not all, of the differences between the two surveys was attributable to difficulty in contacting lower-income families by telephone. Additional differences appeared related to difficulty in contacting families of youth who were no longer in school, and particularly those who had dropped out.

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* These differences in school completion status are substantial. However, we did not want to weight the sample by school completion status to adjust for these differences because school completion status was an important outcome variable. Fortunately, the school record abstract also contained information on school completion status. As explained later in this report, when these survey results were added to the telephone and in-person survey results, and appropriate income-based weights were applied, school completion status could be "correctly" estimated to within 1%. The "correct" estimate was derived by using the in-person interview respondents to estimate school completion status for telephone interview nonrespondents and using telephone interview respondents to estimate the status of the remainder of the population.

Nonresponse Bias in the School Record Abstracts and School Program Survey

The school record abstracts and the school program survey exhibited response rates comparable to those of the parent/guardian telephone interviews. Consequently, we also examined these components of the project to assess the possible extent of nonresponse bias. Unfortunately, because there was no nonresponse survey for the school record abstracts and school program survey, only indirect inference concerning nonresponse bias for these data collection instruments is possible. The analysis consists of comparing parent/guardian responses of youth who did and who did not have student record abstracts and school program surveys.

Table 8 compares school record abstract and school program survey respondents and nonrespondents with respect to the responses provided by the parents/guardians of these youth. The first column lists the items in the parent/guardian survey used for comparison. The second column displays the results for the 7,357 students with a complete or almost complete parent/guardian interview. Of these 7,357 students, 2,614 lack either a school record abstract or a school program survey, or both. Table 8 shows that 61.2% of students were males (on an unweighted basis) and 85.9% lived with a parent. The third and fourth columns show results for the 1,625 and 5,732 students without and with a school program survey, respectively, among the 7,357 students with a parent/guardian interview. The fifth and sixth columns show results for the 2,402 and 4,955 students without and with a school record abstract, respectively, among the 7,357 students with a parent/guardian interview. The last column displays results for the 4,743 students with all three survey instruments.

Comparison of the first and last groups of youth in Table 8 demonstrates the overall extent of bias associated with the lack of either a school record abstract or a school program survey, because the first group is the least restrictive (i.e., includes all youth with a complete or almost complete parent/guardian interview) and the last group is the most restrictive (i.e., includes only youth with all three data collection instruments). Only a very modest bias is demonstrated. The items exhibiting the largest differences are Caucasian race (63.4% for the least restrictive group versus 66.2% for the most restrictive group), currently enrolled in school (62.5% vs. 66.8%), graduated (72.9% vs. 76.5%), dropped out (18.3% vs. 15.7%), and belonged to school or community group in the last year (40.7% vs. 43.6%).

Table 8
COMPARISON OF PARENT/GUARDIAN RESPONSES FOR STUDENTS WITH AND WITHOUT THE STUDENT RECORD ABSTRACT AND SCHOOL PROGRAM SURVEY

Response to Parent Questionnaire	With Parent/ Guardian Interview	Without School Program Survey	With School Program Survey	Without School Record Abstract	With School Record Abstract	With Three Survey Instruments
Number of youth	7357	1625	5732	2402	4955	4743
Percentage of youth:						
Male	61.2	61.4	61.2	62.1	61.0	60.3
Lives with parent	85.9	77.8	87.8	82.6	87.3	87.9
Lives alone	1.3	2.5	1.1	1.9	1.1	1.1
Lives with spouse or roommate	2.8	5.1	2.3	3.6	2.5	2.3
Lives with family member or friend	2.7	3.8	2.5	3.2	2.5	2.5
Lives in residential or boarding school	2.5	2.4	2.5	2.5	2.5	2.4
Lives in a college dorm	0.5	0.7	0.5	0.4	0.5	0.5
Lives in military housing	0.2	0.4	0.1	0.2	0.1	0.1
Lives in a supervised group home	2.0	2.8	1.9	2.5	1.8	1.7
Lives in a mental health facility	0.5	1.9	0.2	1.2	0.3	0.3
Lives in facility or institute for disabled	1.2	2.4	0.9	1.7	0.9	0.9
Lives in a correctional facility	0.3	0.3	0.3	0.2	0.3	0.3
Black	23.9	30.9	22.3	28.1	22.1	22.1
White	63.4	53.7	65.7	56.3	66.4	66.2
Hispanic	10.3	12.6	9.8	13.0	9.2	9.4
American Indian or Alaskan Native	0.8	0.7	0.8	0.7	0.8	0.8
Asian	1.6	2.2	1.5	1.9	1.5	1.5
Youth now enrolled in school	62.5	38.5	68.2	53.5	66.4	66.8
Graduated	72.9	66.5	75.7	67.7	75.9	76.5
Dropped out	18.3	23.4	16.2	22.3	16.1	15.7
Temporarily suspended	0.6	0.5	0.7	0.7	0.6	0.7
Permanently expelled	1.0	0.9	1.1	1.0	1.0	1.0
Older than age limit	7.1	8.7	6.4	8.4	6.3	6.2
Youth gets paid for work outside home, school	29.1	27.6	29.4	27.7	29.6	29.7
Any postsecondary education	21.0	22.5	20.3	20.3	21.3	21.7
Belonged to school or other group in last year	40.7	30.5	43.0	34.9	43.2	43.6
Lives in a one-parent household	34.1	40.4	32.7	37.7	32.6	32.7
HOH[a] education: 11th grade or less	34.1	40.4	32.7	37.6	32.6	32.5
HOH education: high school diploma	33.9	33.7	33.9	33.3	34.1	34.1
HOH education: < 4 years of college	17.4	13.9	18.2	15.5	18.2	18.3
HOH education: 4-yr degree or beyond	14.6	11.9	15.2	13.6	15.1	15.1
Head of household has a paid job now	74.3	67.7	75.7	71.2	75.6	75.7
Household income < $12,000	26.3	35.0	24.4	30.2	24.7	24.7
Household income ≥ $12,000 and < $25,000	29.6	29.5	29.6	30.1	29.4	29.4
Household income ≥ $25,000	44.1	35.5	45.9	39.7	45.9	45.9
Youth able to answer questions for self	71.7	69.6	72.2	72.0	71.6	71.4
Mean values on:						
Average hourly wage if paid ($)	3.72	3.87	3.69	3.82	3.69	3.68
Self-care ability scale	11.0	11.0	11.0	11.0	11.0	11.0
Functional mental skills scale	13.0	13.1	12.9	13.0	13.0	13.0
Household-care ability scale	10.0	10.3	10.0	10.1	10.0	10.0

[a] Head of household.

Although the overall effect of bias is relatively small, there are important differences between those with and without a school record abstract and school program survey. These differences are consistent across both instruments, and are as follows:

- ***Current enrollment in school.*** Youth missing either the school record abstract or the school program survey were much less likely to be currently enrolled in school. For example, only 38.5% of youth missing a school record abstract were currently in school versus 68.2% of youth who were not missing a school record abstract. Presumably, it was much easier to locate student records and to convince school administrators to fill out the school program survey when youth were currently enrolled.

- ***School completion status.*** Youth missing either the school record abstract or the school program survey and who had left school were more likely to have dropped out and less likely to have graduated. For example, only 66.5% of youth who were missing the school record abstract and had left school graduated, versus 75.7% for youth who were not missing the school record abstract.

- ***Living arrangements.*** Youth missing either the school record abstract or the school program survey were less likely to live with a parent. Presumably, this is partially related to the lower school enrollment rate.

- ***Household demographics.*** Youth missing either the school record abstract or the school program survey were more likely to be black or Hispanic and less likely to be white, more likely to come from one-parent households, less likely to reside in a household where the head of household was employed, and more likely to reside in a household earning less than $12,000 per year. Presumably, these household demographics also are associated with lower school enrollment rates.

Item Nonresponse

Item response rates on all three data collection instruments (the parent/guardian interview, the school record abstract, and the school program survey) were very high. For the parent/guardian interview, the item with the lowest response rate (87.6%) was household income, presumably because this item was viewed by some respondents as being personal and unrelated to their child's disability. Other items on the parent/guardian questionnaire had response rates in excess of 90%, and typically higher than 95%. On the school record abstract, the items with the lowest response rates were IQ and the number of days absent from school. Other items had higher response rates, typically in excess of 90%. Response rates for items in part A of the school program survey were all in excess of 90%. Unweighted response rates for household income, IQ, and numbers of days absent are presented in Table 9. We conclude that, with the exception of IQ, item response rates are acceptable. However, when rates of item nonresponse are combined with the response rate for each instrument, the percentage of youth who were originally available for interview and actually had income, IQ, and absenteeism data ranged from 58% (household income) to 42% (IQ).

Table 9
UNWEIGHTED RESPONSE RATES FOR ITEMS WITH HIGH NONRESPONSE

Data Characteristics	Total	Primary Disability Category										
		Learning Disabled	Emotionally Disturbed	Speech Impaired	Mentally Retarded	Visually Impaired	Hard of Hearing	Deaf	Orthopedically Impaired	Other Health Impaired	Multiply Handicapped	Deaf/ Blind
Percentage of:												
Parent/guardian interviews with household income	87.6	87.2	88.5	87.7	86.4	86.1	90.7	88.4	89.2	85.8	85.9	88.9
N	6,879	935	617	464	900	736	673	779	652	419	616	88
Youth available for interview with household income	58.1	58.7	55.7	51.4	52.4	56.0	56.9	73.3	59.7	60.0	60.9	50.2
N	10,369	1,390	980	792	1,485	1,132	1,072	940	974	599	869	156
Abstracts with IQ data	70.4	83.7	76.7	50.5	85.9	71.8	60.0	65.6	63.6	46.7	71.0	38.9
N	6,241	895	557	422	933	652	564	714	560	305	561	78
Youth available for interview with IQ data	42.4	53.9	43.6	26.9	54.0	39.6	31.6	52.1	36.6	23.8	45.8	19.4
N	10,369	1,390	980	792	1,485	1,132	1,072	940	974	599	869	156
Abstracts with absenteeism data	83.5	86.1	80.3	79.1	86.3	86.4	83.8	87.8	75.1	82.4	80.3	91.7
N	6,241	895	557	422	933	652	564	714	560	305	561	78
Youth available for interview with absenteeism data	50.3	55.4	45.6	42.2	54.2	49.8	44.1	66.7	43/2	42.0	51.8	45.8
N	10,369	1,390	980	792	1,485	1,132	1,072	940	974	599	869	156

WEIGHTING THE COMBINED DATABASE

This section describes the procedures used to weight the combined database. First, we discuss the decisions that affected our choice of a weighting procedure. Second, we briefly describe the five steps in weighting the database. Next, we discuss in detail one of the steps that involved deriving an income adjustment factor related to the in-person parent/guardian interview.

Decisions Affecting the Weighting Procedure

Weighting of survey data is often a relatively simple process wherein each sample respondent is weighted inversely to the probability of sample selection, with an adjustment for nonresponse. Weighting of the NLTS data was more complicated for four reasons. First, there were multiple instruments, with overlapping sets of respondents—4,955 youth had both a parent/guardian interview and school record abstract; 1,270 youth had a school record abstract but no parent/guardian interview; and 2,179 youth had a parent/guardian interview but no school record abstract. Second, there was a nonresponse survey that indicated that respondents differed systematically from nonrespondents. Third, the high stratification of the universe (into 3,168 strata) and the given response rates resulted in many strata without respondents to one or both surveys. Fourth, for some of the low-incidence disabilities (deaf, visually impaired, orthopedically impaired, and deaf/blind), the customary weights of respondents in the smaller LEA strata would have been very large relative to the weights of respondents for larger LEA strata, dramatically reducing the effective sample size of the survey. For these reasons, we made a number of minor adjustments to the usual weighting procedures.

A procedure for weighting the combined database was developed that incorporated the following decisions:

- ***Sufficient personal data.*** Weighting was restricted to students with sufficient personal data for meaningful analysis. This excluded respondents who had only the school program survey (which related to the general special education program, rather than to the courses and services actually provided to the student) and students with very sparse parent/guardian interview and school record abstract data.

- ***Single set of weights.*** A single set of weights was developed for all respondents with sufficient personal data for meaningful analysis. The alternative to development of a single set of weights was to develop separate sets of weights for the school record abstracts and parent/guardian survey, a third set of weights for variables that were developed using responses to questions common on both instruments, and a fourth set for analyses that

required data from both instruments. This number of different weights would lead to confusion on the part of analysts, reviewers, and users of reports generated from the data.* (For example, the marginal distributions of each variable on a cross-tabulation involving two variables from different instruments would not have been consistent with the marginal distributions of those variables computed using single-instrument weights.)

- ***Adjustment for nonresponse bias.*** To the extent possible, the weights for the respondents were developed to compensate for known nonresponse biases. Sources of information concerning nonrespondents to the telephone survey included both the 442 in-person parent/guardian interviews and 1,270 school record abstracts of additional youth for whom a parent/guardian survey had not been administered by telephone.

- ***Pooling of youth.*** For all LEAs in a particular LEA stratum, youth within the same disability category and age substrata received equal weights. That is, the weights for youth were calculated as if within each LEA stratum we had compiled a single list of youth with a particular handicap and age group and had selected sample members randomly from that list. (This contrasts with our actual procedure of selecting sample members from each separate LEA list using comparable sampling rates.)

- ***Collapsing of strata.*** Strata with similar responses or similar sampling rates were collapsed to reduce the variability in weights associated with random nonresponse.

- ***Reduction of large weights.*** Weights for youth in the deaf, visually impaired, and orthopedically impaired categories in the smaller LEA strata were reduced marginally to increase the effective sample size. Weights for youth in the next-larger LEA strata were correspondingly increased to reduce bias. Three deaf/blind respondents in the medium LEA strata were discarded. The universe for the deaf/blind was defined to include only those deaf/blind youth who attended one of the state-operated schools or LEAs with an enrollment of at least 10,000.

Weighting Procedure

The weighting procedure consisted of five steps.

Step 1—The first step was to construct a file consisting of all youth with sufficient information for meaningful analysis. This file consisted of youth with at least one of the following: (1) a complete or almost complete parent/guardian telephone interview, (2) a complete or almost complete parent/ guardian in-person interview, or (3) a school record

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* The responses to the parent/guardian telephone interviews were available before responses to other data collection instruments. Because we wanted to perform preliminary tabulations using these responses, we calculated an early set of weights for telephone interview respondents. The results from these tabulations were quite similar to those obtained with the final set of weights (which considered all data collection instruments). On this limited basis, we conjecture that the use of multiple weights would not have substantially affected estimates. Nevertheless, a proliferation of different weights and corresponding estimates that were similar but not identical would have been confusing.

abstract. If a youth had no abstract but did have a partially completed parent/guardian interview, that interview was reviewed on an individual basis to determine whether it was sufficiently complete to allow inclusion of the youth in the file. Youth having only school survey data were not weighted because the school survey provided no individual-level data. As mentioned earlier, the final file contained a total of 8,404 youth.

Step 2—The second step was the collapsing of the sampling strata to facilitate weighting by reducing the number of cells with no respondents and to reduce the variability in weights attributable to random nonresponse. Our initial analyses had shown that among stratifying variables, response variability was mostly a function of the youth's disability category and age group. Therefore, these strata were not collapsed. On the other hand, the LEA strata had a surprisingly small effect on responses. For example, the average intracluster correlation of all youth within an LEA over a set of important variables on the parent/guardian questionnaire* was only 0.036, indicating that LEA stratification variables were less important than originally thought. We collapsed the LEA strata as follows:

- Geographical regions were collapsed. This stratification variable had been used to assure adequate geographic diversity in the sample within each district size and wealth substratum. However, the sampling rates within LEA size strata were very similar across regions, making it a logical candidate for collapsing. In addition, of all the LEA stratification variables, it demonstrated the weakest effect on responses, apparently because there was substantial diversity within each geographic region.

- Small and very small LEAs were collapsed. These smaller LEAs provided very similar services to students with disabilities, and frequently entered into cooperative agreements with larger LEAs for the provision of services.** In addition, the sampling rates for these LEAs and youth within these LEAs were similar.

- The two lowest wealth strata were collapsed and the two highest wealth strata were collapsed. Sampling rates within LEA size strata for the two lowest wealth strata and for the two highest wealth strata were very similar. In addition, this variable did not show as large an effect on the response variables as we had anticipated. This might be a consequence of the fact that the QED data on wealth were based on the 1980 census, whereas data were collected 7 years later.

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* These variables included whether the student did any work for which he/she was paid (other than his/her work-study job or work around the house), the hourly wage earned by the student if he/she worked, a household-care ability score, an intellectual ability score, a self-care ability score, whether the student belonged to a school or community group in the past year, whether the student had any postsecondary education, whether the youth was in school in the past 12 months, the student's exit status from school (graduated, dropped out, suspended, etc.), and the number of services received by the youth in the past year (ranging from 0 to 21).

** James S. Fairweather, "Analysis of a survey of school-district practices regarding secondary-level handicapped students and their transition to postsecondary experiences," Center for the Study of Higher Education, The Pennsylvania State University, September 15, 1986.

These actions had the effect of reducing the number of LEA strata from 96 (defined by 4 geography categories, 6 size categories, and 4 wealth categories) to 10 (defined by 5 size categories and 2 wealth categories). Within each LEA stratum, there were 33 substrata for students, defined by 11 disability categories and 3 age categories. Thus, the total number of strata for youth in LEAs was reduced from 3,168 (i.e., 96 x 33) to 330 (i.e., 10 x 33). In addition, there were 15 youth strata in state-operated schools, defined by 5 disability categories (i.e., deaf, hard of hearing, visually impaired, multiply handicapped, and deaf/blind) and 3 age categories.

Step 3—The third step was the computation of weights in the traditional manner within each of the 345 strata, under the assumption that all youth within a stratum could be pooled and assigned a common weight. That is, each youth in a stratum was assigned a weight given by the following formula:

$$W_i = (N_i / n_i) \times (M_i / m_i)$$

where i is an index denoting one of the 346 strata, N_i is the number of LEAs in the universe in the *i*th stratum, n_i is the number of participating LEAs in the *i*th stratum, M_i is the number of youth with the appropriate disability and age category for the *i*th stratum as listed on the combined enrollment lists of the ni participating LEAs, and m_i is the number of youth with adequate data for meaningful analysis from among the M_i youth.

After completing the third step, we calculated the approximate sampling efficiency for each disability category. The sampling efficiency was estimated using the following formula:

$$Eff_k = (M[w_k])^2 / [\, Var[w_k] + (M[w_k])^2]$$

where Eff_k is the sampling efficiency of the *k*th disability category, $M[w_k]$ is the mean value of the weights of all respondents in the *k*th disability category, and $Var[w_k]$ is the variance of those weights. This formula ignores the very weak clustering effects. An efficiency of 50% may be interpreted to mean that a simple random sample of youth in the *k*th disability category half the size of the actual sample would have yielded equal precision. (Variance estimates based on pseudo-replication were later compared with those based on this simple equivalence to random sampling, and these comparisons demonstrated the appropriateness of the above formula.)

Sampling efficiencies were lower than desired for four low-incidence disability categories (deaf/blind, orthopedically impaired, visually impaired, and deaf). Sampling efficiencies for these disability categories were 5%, 26%, 34%, and 41%, respectively. These sampling efficiencies were low primarily because of the large weights for the few youth in the smaller LEAs. We considered three alternatives:

- Tolerate the low effective sample sizes. This alternative was considered unacceptable.

- Change the definition of the universe for these disability categories by removing smaller LEAs and all respondents from these LEAs. We chose this alternative for the deaf/blind disability category because there were only 3 deaf/blind respondents in medium or smaller LEAs. These respondents had weights that ranged from 10 to 400 times the size of the average weight for the remaining 100 respondents. Removing these 3 respondents raised the sampling efficiency to 85%. For the other disability categories, there were enough respondents in smaller LEAs that we felt this action would be imprudent.

- Reduce the weights for youth in the smaller LEAs. We chose this alternative for youth in the orthopedically impaired, visually impaired, and deaf categories. In addition, to decrease any possible biases so introduced, we increased the weights of youth in next-larger LEAs, so that the sum of the weights over all youth in each disability category was unchanged. This action increased sampling efficiencies for these youth to 60%, 48%, and 56%, respectively.

Step 4—As discussed above, the fourth step was the modification of weights for youth in the deaf/blind, orthopedically impaired, visually impaired, and deaf categories. The effects of these weight modifications on the universe are shown in Table 10. For example, the effect of weight modification was to reduce the percentage of deaf students in small and medium-sized LEAs from 30.5% to 22.7%, and to correspondingly increase the percentage of students in large and very large LEAs from 14.6% to 22.6%. Thus, the NLTS sample is weighted to somewhat underrepresent deaf students in small and medium LEAs and to somewhat overrepresent deaf students in large and very large

Table 10
PERCENTAGE OF YOUTH IN STATE-OPERATED SCHOOLS AND DIFFERENT SIZE LEAS BEFORE AND AFTER MODIFICATION OF WEIGHTS

	Percentage of Youth Who Were:					
	Orthopedically Impaired		Visually Impaired		Deaf	
Stratum	Before	After	Before	After	Before	After
State-operated school	0.0	0.0	19.7	19.7	36.4	36.4
Huge	28.3	28.3	22.4	22.6	18.5	18.5
Very large	10.3	11.9	7.4	14.3	4.1	10.5
Large	21.3	33.5	12.8	14.8	10.5	12.1
Medium	19.7	14.7	25.7	18.3	23.1	15.4
Small	20.5	11.5	12.1	10.3	7.4	7.3

LEAs. We also performed a number of tabulations to ascertain whether these weight modifications introduced biases, as shown in Table 11. The amount of bias introduced was small in all the variables examined.*

The weighting procedure that we had implemented to this point still did not address the differences that we found between the in-person and telephone interview respondents. These differences were both statistically significant and substantial. Therefore, we felt that it would be desirable to use the data from the nonresponse survey in conjunction with the data from the telephone survey to achieve better estimates of the universe than could be achieved by use of the telephone survey respondents alone. Our first option for doing this was to weight the in-person responses to represent the nonrespondents to the telephone survey. Unfortunately, there were too few respondents to the in-person survey, and they were too disproportionately distributed among strata to allow them to represent all nonrespondents. To have weighted in-person respondents to represent all nonrespondents to the telephone survey would have reduced the effective sample size of the survey substantially; in addition, 164 of the 330 strata and an additional 15 state-operated school strata had no respondents to the in-person interview.

Our second option for using the data from the in-person interviews to achieve better estimates of the universe was to pool the interviews, regardless of whether they were obtained in person or via telephone, and weight the pooled sample to represent the universe of special education students. (This is the approximate condition of our weighting procedure after the fourth step as described above.) Unfortunately, this procedure still would have underrepresented nonrespondents—the nonrespondents to the telephone survey were projected to be 30% of the universe, whereas in-person interview respondents were only 6% of the combined pool of in-person and telephone interview respondents. In addition, 197 strata would have consisted entirely of telephone interviewees, so that the adjustment would have been ineffective.

Step 5—Our third option, and the one implemented in the fifth step, was to estimate the household income distribution for each disability category using the in-person and telephone interviews, and to adjust the weights of all respondents to achieve this marginal distribution. This procedure is described in the next section. These adjustments were not large. The weights of respondents with household incomes less than $12,000 were multiplied by a factor ranging from 1.30 to 1.59 (depending on disability category); the weights of respondents with household incomes between

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* The fact that average responses with unmodified and modified weights were similar does not imply that the modified weights are more desirable than they would otherwise be; neither would large differences imply that the modified weights are less desirable. Weighting must be done correctly, whether or not the weighted results change.

Table 11
COMPARISON OF WEIGHTED RESULTS FOR THREE HANDICAPPING CONDITIONS BEFORE AND AFTER MODIFICATION OF WEIGHTS OF YOUTH IN SMALLER LEAS

	Deaf		Orthopedically Impaired		Visually Impaired	
	Before	After	Before	After	Before	After
Percentage of youth:						
In secondary school	55.7	55.6	61.8	62.0	64.1	65.2
Out of school 1 year or less	20.3	21.2	23.8	21.7	18.8	18.2
Out of school 1 to 2 years	23.9	23.2	14.4	16.3	17.0	16.6
Graduated from high school	31.1	31.8	28.4	27.4	23.6	23.5
Aged out of high school	7.6	7.2	3.6	2.8	4.5	4.4
Dropped out or left high school	4.5	4.6	3.8	4.9	6.0	5.2
Male	56.4	55.6	55.5	54.1	56.5	56.1
Black	21.5	21.8	16.1	17.3	21.6	22.6
White	66.9	66.2	67.8	65.7	69.2	67.7
Hispanic	8.6	8.7	12.7	14.0	7.0	7.4
Other ethnic background	3.0	3.3	3.4	3.1	2.2	2.3
Head of household education: 11th grade or less	31.5	30.3	27.7	28.0	32.6	31.0
Head of household education: high school graduate	36.9	36.8	33.2	32.0	33.6	33.9
Head of household education: some college	19.0	20.0	18.6	18.5	16.7	17.4
Head of household education: 4-year degree or more	12.6	12.9	20.5	21.5	17.2	17.8
Household income: less than $12,000	23.7	23.1	28.0	25.9	21.6	21.5
Household income: $12,000 to $24,999	35.5	33.2	28.5	29.7	32.6	31.1
Household income: $25,000 or more	40.8	43.6	43.5	44.5	45.9	47.4
Youth had paid job in past year	58.1	58.3	36.0	32.3	50.2	49.2
Youth has had any postsecondary education	34.2	35.5	19.7	21.0	28.1	31.4
Youth belonged to school/community group in past year	55.2	53.5	39.4	40.1	49.1	50.2
Mean values on:						
Self-care ability scale	11.6	11.6	9.9	9.7	10.7	10.8
Functional mental skills scale	13.7	13.7	13.7	13.4	11.9	12.0
Household-care ability scale	11.5	11.4	9.2	8.8	10.0	10.0

$12,000 and $24,999 were multiplied by a factor between 0.97 and 1.07; and the weights of respondents with household incomes of $25,000 or more were multiplied by a factor between 0.67 and 0.78. The weights of respondents who did not report household income (including those with only record abstracts) were not changed. Because the weights of youth in different LEA size strata spanned wide ranges, these weight adjustments increased the coefficient of variation* of youth weights by only 10% (for the speech impaired) to 29% (for the emotionally disturbed). Table 12 compares the results obtained before and after income adjustment for youth in three disability conditions—learning disabled, mentally retarded, and emotionally disturbed—the latter being the condition for which the income adjustments had the largest effect overall.

Procedure for Developing Income Adjustment Factors

This section describes the procedures used to develop the income adjustment factors that were applied to adjust partially for telephone survey nonresponse bias. The first step was to estimate the proportion of the population represented by telephone survey respondents and its complement, the proportion of the population that would have been nonrespondents had the entire population been selected for the survey. To do this, we calculated weights (using the second and third steps of the weighting procedure as described in the previous discussion) for all youth who were sampled, whether or not they had a completed parent/guardian telephone interview. That is, we calculated weights as if the parents/guardians of all sampled youth were respondents. Then, within disability category, we summed the weights for telephone survey respondents and nonrespondents. These two sums then were divided by the total of all weights for the disability category to establish the percentage of telephone survey respondents and nonrespondents. For example, as shown in the first two lines of Table 13, the percentage of telephone survey respondents in the universe of the mentally retarded was estimated to be 63.2%, and the percentage of telephone survey nonrespondents was estimated to be 36.8%.

The second step was to calculate the income distribution for telephone survey respondents weighted to the universe of estimated telephone survey respondents (i.e., the estimated 64.8% of all special education students whose parents/guardians would have responded to the telephone survey had they been selected for the sample). For example, as shown in Table 13, we estimated that in the universe of telephone survey respondents 28.4% of the mentally retarded would come from households with family incomes less than $12,000 per year.

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* The coefficient of variation of youth weights is the standard deviation of youth weights divided by the mean of youth weights. Increasing the coefficient of variation tends to decrease the effective sample size.

Table 12
COMPARISON OF WEIGHTED RESULTS FOR THREE HANDICAPPING CONDITIONS BEFORE AND AFTER MODIFICATION OF WEIGHTS BY HOUSEHOLD INCOME LEVEL

	Learning Disabled		Mentally Retarded		Emotionally Disturbed	
	Before	After	Before	After	Before	After
Percentage of youth:						
In secondary school	66.8	66.8	61.1	60.7	59.2	58.6
Out of school one year or less	16.6	16.4	21.0	21.2	21.9	22.0
Out of school 1 to 2 years	16.5	16.8	17.9	18.1	18.9	19.3
Graduated from high school	19.7	19.1	17.8	17.9	17.1	15.9
Aged out of high school	0.9	0.9	6.0	5.9	1.2	1.3
Dropped out or left high school	10.8	11.3	11.5	12.0	19.0	20.5
Male	74.2	74.2	56.4	56.8	76.5	75.9
Black	19.4	21.6	28.4	31.0	22.1	25.1
White	70.1	67.2	63.9	61.0	71.1	67.1
Hispanic	7.6	8.4	5.3	5.6	5.5	6.0
Other ethnic background	3.0	2.8	2.5	2.5	1.3	1.7
Head of household education: 11th grade or less	34.7	37.7	45.9	49.5	37.6	43.7
Head of household education: high school graduate	39.2	39.1	34.1	33.1	30.6	29.1
Head of household education: some college	15.9	14.5	11.0	10.2	20.2	18.0
Head of household education: 4 year degree or more	10.2	8.7	9.0	7.3	11.6	9.2
Household income: less than $12,000	22.2	30.9	32.0	41.7	24.4	37.7
Household income: $12,000 to $24,999	32.8	34.1	33.2	32.2	32.5	31.7
Household income: $25,000 or more	45.0	35.1	34.8	26.1	43.2	30.6
Youth had paid job in past year	68.7	67.4	47.0	45.8	69.3	67.3
Youth has had any postsecondary education	16.8	15.6	9.0	8.4	14.4	14.7
Youth belonged to school/community group in past year	42.5	40.6	31.4	29.9	30.6	29.3
Mean values on:						
Self-care ability scale	11.9	11.9	10.8	10.9	11.9	11.9
Functional skills scale	14.5	14.5	11.6	10.7	14.4	14.3
Household-care ability scale	10.8	10.8	9.6	9.6	10.2	10.2

Table 13
CALCULATION OF INCOME ADJUSTMENTS TO WEIGHTS

		Primary Disability Category											
		Learning Disabled	Emotionally Disturbed	Speech Impaired	Mentally Retarded	Visually Impaired	Hard of Hearing	Deaf	Orthopedically Impaired	Other Health Impaired	Multiply Handicapped	Deaf/ Blind	Total
Fraction respondents		0.7	0.6	0.7	0.6	0.6	0.6	0.7	0.6	0.5	0.6	0.7	0.6
Fraction nonrespondents		0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.5	0.4	0.3	0.4
Income distribution (%) from parent telephone interview weighted to all respondents	<$12K	19.3	21.8	24.3	28.4	19.9	15.7	22.8	24.6	22.6	21.7	18.9	
	$12K-25K	33.1	31.1	33.8	33.7	32.1	34.1	34.5	28.9	25.6	35.2	34.9	
	≥$25K	47.6	47.2	41.9	37.9	47.9	50.2	42.7	46.6	51.8	43.1	46.2	
Income distribution (%) from in-person parent interview weighted to all nonrespondents	<$12K	64.4	51.5	- - *	68.1	38.4	43.4	38.0	64.2	49.5	71.1	NA**	
	$12K-25K	26.6	45.0	- -	26.7	43.4	48.7	62.0	35.8	39.0	24.5	NA	
	≥$25K	9.0	3.5	- -	5.2	18.3	8.0	0.0	0.0	11.5	4.3	NA	
Ratio of income distributions	<$12K	3.3	2.4	- -	2.4	1.9	2.8	1.7	2.6	2.2	3.3	NA	2.4
	$12K-25K	0.8	1.5	- -	0.8	1.4	1.4	1.8	1.2	1.5	0.7	NA	0.9
	≥$25K	0.2	0.1	- -	0.1	0.4	0.2	0.0	0.0	0.2	0.1	NA	0.2
Overall ratio times telephone income distribution	<$12K	47.2	53.1	59.3	69.2	48.7	38.4	55.7	60.0	55.1	52.8	46.2	
	$12K-25K	31.1	29.2	31.8	31.7	30.2	32.0	32.5	27.1	24.1	33.2	32.8	
	≥$25K	7.6	7.6	6.7	6.1	7.7	8.0	6.8	7.5	8.3	6.9	7.4	
	Total	85.9	89.8	97.7	107.0	86.5	78.4	95.0	94.6	87.5	92.9	86.4	
Estimated income distribution of nonrespondents (%)	<$12K	54.9	59.1	60.6	64.7	56.2	48.9	58.6	63.4	63.0	56.9	53.5	
	$12K-25K	36.2	32.5	32.5	29.6	34.9	40.9	34.2	28.7	27.5	35.7	38.0	
	≥$25K	8.9	8.4	6.9	5.7	8.9	10.2	7.2	7.9	9.5	7.4	8.6	
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Estimated income distribution in universe (%)	<$12K	30.9	37.8	36.9	41.7	33.8	27.7	33.9	38.8	41.9	36.4	30.5	
	$12K-25K	34.1	31.7	33.4	32.2	33.2	36.5	34.4	28.8	26.5	35.5	35.9	
	≥$25K	35.0	30.5	29.7	26.0	33.1	35.8	31.7	32.4	31.6	28.2	33.6	
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Income distribution for youth with parent inteview or abstract weighted to universe	<$12K	22.2	24.4	25.8	32.0	21.6	18.6	23.7	28.0	25.7	25.0	19.2	
	$12K-25K	32.8	32.5	33.0	33.2	32.6	34.2	35.5	28.5	27.2	34.2	33.9	
	≥$25K	45.0	43.2	41.3	34.8	45.9	47.2	40.8	43.5	47.1	40.8	47.0	
Multiplier	<$12K	1.4	1.6	1.4	1.3	1.6	1.5	1.4	1.4	1.6	1.5	1.6	
	$12K-25K	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.1	
	≥$25K	0.8	0.7	0.7	0.8	0.7	0.8	0.8	0.7	0.7	0.7	0.7	

* Not available
** Not applicable

The third step was to calculate the income distribution for in-person interview respondents weighted to the universe of estimated telephone survey nonrespondents (i.e., the estimated 35.2% of all special education students who would not have responded to the telephone survey had they been selected for the sample). This distribution is only approximate, because in many of the disability categories, there were no in-person respondents in some of the strata (especially those for state-operated schools and smaller LEAs). For example, as shown in Table 13 we estimate that in the universe of telephone survey nonrespondents, 68.1% of the mentally retarded would come from households with family incomes less than $12,000 per year.

The fourth step was to calculate the ratio of the two income distributions. For example, as shown in Table 13, the ratio of the proportion of nonrespondents in the mentally retarded category with household incomes below $12,000 to the proportion of telephone survey respondents in that category with household incomes below $12,000 was 2.40 = 68.1% / 28.4%. We note that these ratios are quite variable across disability categories as a consequence of small sample sizes.

The fifth step was to calculate an approximate overall ratio of income distributions. To do this, we weighted the ratios from each disability category by their estimated precision. As shown in the last column of Table 13, we estimated that, overall, the proportion of nonrespondents with household incomes below $12,000 was 2.44 times the proportion of respondents with household incomes below $12,000. Similarly, the proportion of nonrespondents with household incomes of $25,000 or more was approximately 0.16 times the proportion of respondents with household incomes of $25,000 or more.

The sixth step was to multiply the approximate overall ratios by the income distribution of respondents, and then to normalize the result to 100%. The objective of this step was to use the overall ratios and the income distribution of telephone survey respondents to estimate the income distribution of telephone survey nonrespondents. This was considered preferable to using the disability-specific ratios because of the small sample sizes in individual disability categories. The results of both parts of this step are shown in Table 13. For example, when we weight the parent/guardian telephone survey for students classified as mentally retarded to all respondents in this disability category, we find that 21.6% are projected to have household incomes less than $12,000 per year. Over all handicapping conditions, we estimate that the proportion of nonrespondent households with incomes less than $12,000 is 2.44 times the proportion of respondent households with incomes less than $12,000. Thus, we could estimate that the percentage of nonrespondents in the mentally retarded category with household incomes less than $12,000 is 69.2% = 2.44 x 21.65%. Similarly we could estimate that the percentage of nonrespondent mentally retarded students with household incomes between $12,000 and $24,999 is 31.7%, and the percentage with household incomes of $25,000 or more is 6.1%. However, these percentages add to

107.0%. If we normalize them to add to 100%, we obtain our final estimates of nonrespondent household income distribution: 64.7% less than $12,000, 29.6% between $12,000 and $24,999, and 5.7% $25,000 or more.

The seventh step was to estimate the income distribution by disability category for the entire universe. The income distribution for telephone survey respondents (as calculated in step 3) was multiplied by the proportion of telephone survey respondents in the universe (as calculated in step 1), and this was added to the product of the income distribution for telephone survey nonrespondents (as calculated in step 6) multiplied by the proportion of telephone survey nonrespondents in the universe (as calculated in step 1). For example, the proportion of youth in the mentally retarded disability category with household incomes below $12,000 was estimated to be 41.7% = (28.4% x 63.2%) + (64.7% x 36.8%).

The eighth step was to weight all survey respondents with sufficient data for analysis to the total population, as described in steps 1 to 3 in the text addressing the weighting procedure. For example, as shown in Table 13, the proportion of youth in the mentally retarded category from households with incomes below $12,000 was estimated via this procedure to be 32.0%. This was less than the 41.7% estimated in step 8 because fewer than 36.8% of the parent/guardian interviews of this disability category were from in-person interviews. Therefore, we sought to adjust the weights to equalize the income distributions calculated in steps 7 and 8.

The ninth step was the calculation of the necessary weight adjustments. These adjustments are the ratio of the income distributions from steps 7 and 8. For example, as shown in Table 13, all youth in the mentally retarded category from households with incomes less than $12,000 had their weights multiplied by a factor of 1.30 = 41.7/32.0. Similarly, youth in the mentally retarded category with incomes of $25,000 or more per year had their weights multiplied by a factor of 0.75 = 26.0/34.8.

CONCLUSIONS

In this section we examine how well the NLTS sample performs and provide guidance on the sample limitations. First, we examine how well the sample is able to estimate school status. Second, we compare the NLTS estimates of the number of students in each disability condition in the universe with U. S. Department of Education counts of the number of students in each condition. Third, we describe the limitations of the sample. Finally, we provide an overall assessment of the usefulness of the sample and the extent to which it represents the intended universe.

Adequacy of Weighting Procedure for Estimating School Status

As mentioned earlier in the section that compared the results of the in-person and telephone surveys, income adjustment only slightly reduced the differences between the two surveys* with respect to the school status variables (i.e., the proportion of youth currently enrolled, the proportion of youth who had graduated, and the proportion of youth who had dropped out). These are important variables for analysis. Fortunately, there is an alternative source of data for these variables, namely the school record abstract. The 1,270 youth with only school record abstracts and the 442 youth with in-person interviews are both representative of nonrespondents to the telephone survey with respect to school status variables. Using the results from the telephone interview alone, we estimated that 65% of all parents/guardians of special education students would have responded to the telephone survey had they been asked and the remaining 35% would have been nonrespondents. As shown in the last line of Table 14, youth with only school record abstracts or with in-person interviews represented 24% of all special education students on a weighted basis. Thus, on an overall basis, youth whose parents/guardians were nonrespondents to the telephone survey, but for whom we could otherwise gather data on school status, only slightly underrepresented telephone survey nonrespondents.

Table 14 also shows the extent of underrepresentation for each disability category. For example, we estimate that if all students classified as emotionally disturbed in the universe had been sampled, 43% of their parents would have been nonrespondents to the telephone survey. There are two sources of data for the school completion status of these nonrespondents: the in-person interview and the school record abstract. The proportion of total weight assigned to respondents for students classified as emotionally disturbed with either an in-person interview or only a school abstract is 23.3%. Thus, without benefit of income weighting of respondents to the parent/guardian telephone survey, the school completion status of more than half of nonrespondents was correctly represented in data tabulations.

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* In various locations in the text we refer to the parent/guardian telephone survey and the parent/guardian in-person survey as two different surveys, even though the survey instruments were very similar, because there were differences in the populations being surveyed and the method of survey administration.

Table 14
PROPORTION OF UNIVERSE AND TOTAL WEIGHTS ASSOCIATED WITH TELEPHONE NONRESPONDENTS

Disability Category	Estimated Percentage of Nonrespondents to the Telephone Survey in the Universe (If Everyone Were Sampled)	Percentage of Total Weight Assigned to Respondents with Either an In-Person Interview or Only a School Abstract
All disabilities	35.2	23.7
Learning disabled	32.6	21.4
Emotionally disturbed	43.0	23.3
Speech impaired	34.8	24.2
Mentally retarded	36.8	30.5
Visually impaired	38.1	19.6
Hard of hearing	36.0	14.5
Deaf	31.0	14.5
Orthopedically impaired	36.7	22.2
Other health impaired	47.8	16.4
Multiply handicapped	41.8	19.1
Deaf/blind	33.0	14.3

To examine further the adequacy of our weighting procedure with respect to school status, we compared school status estimated using two different sets of weights. The first set was the weights calculated as described above (i.e., the final weighting procedure). The second set used weights calculated via the following three steps:

- Estimate the proportion of youth in the universe whose parents/guardians would have responded to the telephone survey if they had been selected, and the complementary proportion who would not have responded.
- Calculate weights for youth with telephone interviews so that they represent all youth whose parents/guardians would have responded to the telephone interview had the entire universe been selected.
- Calculate weights for youth with in-person interviews or only school record abstracts so that they represent all youth whose parents/guardians would not have responded to the telephone interview had the entire universe been selected.

We have termed the second method the "separate" weighting method, because weights are calculated for different data collection instruments to extrapolate to separate and disjoint portions of the universe.

Table 15 shows school status calculated using both of these sets of weights. Generally there is very good agreement between these two different weighting methods. Almost all estimates differ by fewer than 3 percentage points. The only exceptions are as follows:

- The percentage of students in the deaf/blind category who had graduated is estimated to be 21.5% based on our final weights and 17.8% based on the separate weighting procedure. Because there are only 100 deaf/blind student respondents and no in-person interviews, this discrepancy is within expectations.

- The percentage of students in the other health impaired category who were in school is estimated to be 70.7% based on our final weights and 63.5% based on the separate weighting procedure. The percentage who had dropped out is estimated to be 7.6% based on the final weights and 13.1% based on the separate weighting procedure.

Overall, there appears to be a very slight bias in the final weighting procedure with respect to overestimating the number of students in school and underestimating both the number who had graduated and the number who had dropped out. In all but one or two disability categories, the number in school is marginally larger with the final weighting procedure than with the separate weighting procedure, and the number graduated and dropped out is marginally smaller with the final weighting procedure than with the separate weighting procedure.

Comparison with OSEP Annual Report to Congress

As a further check on the reasonableness of our estimates of the number of special education students, we compared the weighted numbers of special education students served by LEAs as estimated by the NLTS and as reported by OSEP in the *10th Annual Report to Congress*. This comparison is shown in Table 16. Three ratios are computed at the bottom of this table: the ratio of the numbers of 13- to 21-year-old students from these two sources, the ratio of the numbers of 14- to 21-year-old students, and the ratio of the numbers of 15- to 21-year-old students.

As is seen in the last column of Table 16, the NLTS slightly underestimates the total number of 13- to-21-year-old special education students (i.e., NLTS estimates are only 94% of OSEP counts), estimates more accurately the number of 14- to 21-year-old special education students, and essentially estimates the correct number of 15- to 21-year-old special education students. There are a number of reasons for the differences in counts of 13- and 14-year-old students. Only students in grade 7 and above were eligible for the NLTS, and some 13-year-olds are in 6th grade. The latter students would be included in the OSEP counts but not in the NLTS estimates. We also expect differences in the number of 13- and 14-year-old students because, as mentioned in the

Table 15
COMPARISON OF SCHOOL STATUS USING COMBINED AND SEPARATE ESTIMATES

Disability Category	In School		Graduated		Aged Out		Dropped Out	
	Combined	Separate	Combined	Separate	Combined	Separate	Combined	Separate
Learning disabled	68.6	68.3	19.1	19.2	0.9	0.9	11.3	11.6
Emotionally disturbed	62.3	59.7	15.9	17.3	1.3	0.9	20.5	22.1
Mentally retarded	64.1	63.6	17.9	17.7	5.9	6.1	12.0	12.7
Speech impaired	75.7	74.9	15.3	16.1	1.2	1.1	7.9	8.0
Orthopedically impaired	65.0	64.0	26.8	26.9	2.8	3.7	5.5	5.4
Deaf	57.8	57.1	30.3	30.7	7.0	7.5	5.0	4.8
Hard of hearing	67.0	65.6	23.8	24.9	4.0	3.5	5.1	6.0
Visually impaired	67.7	64.3	22.4	23.7	4.4	4.4	5.4	7.6
Deaf/blind	50.0	50.1	21.5	17.8	24.6	26.1	3.9	5.9
Other health impaired	70.7	63.5	19.2	21.1	2.6	2.3	7.6	13.1
Multiply handicapped	74.7	74.2	8.1	8.2	12.7	13.3	4.5	4.3

Note: "Combined" estimates are computed using the final weighting procedure. The term "combined" refers to the fact that respondents to the parent/guardian telephone and in-person surveys and students for whom school record abstracts were available are weighted as a group using the same procedures. "Separate" estimates are computed by weighting telephone survey respondents to the portion of the universe that would have been expected to respond to the telephone survey if all students in the universe had been sampled, and by weighting in-person survey respondents and students who have abstracts but no parent/guardian questionnaire to the portion of the universe that would not have been expected to respond to the telephone survey if all students in the universe had been sampled.

Table 16
COMPARISON OF NLTS ESTIMATES OF NUMBER OF SPECIAL EDUCATION STUDENTS WITH COUNTS IN *10TH ANNUAL REPORT TO CONGRESS*

Data Source/Student Age	Learning Disabled	Emotionally Disturbed	Speech Impaired	Mentally Retarded	Visually Impaired	Deaf/ Hard of Hearing	Orthopedically Impaired	Other Health Impaired	Multiply Handicapped	Deaf/ Blind	Total
10th Annual Report											
13-year-olds	181,406	32,412	24,565	46,948	1,323	2,859	2,644	3,378	5,116	36	300,687
14-year-olds	186,449	36,080	18,263	52,988	1,296	3,044	2,925	4,024	3,876	33	308,978
15-year-olds	176,927	37,543	13,504	54,855	1,324	2,911	3,086	4,656	3,673	46	298,525
16-year-olds	148,545	31,331	9,758	52,069	1,144	2,516	2,814	4,049	3,133	37	255,396
17-year-olds	118,855	23,660	6,913	47,025	1,065	2,514	2,452	3,468	2,695	49	208,696
18-year-olds	57,298	10,130	2,053	34,176	606	1,612	1,626	1,556	2,054	26	111,137
19-year-olds	15,222	3,524	803	17,749	248	691	889	803	1,544	22	41,495
20-year-olds	4,604	1,855	319	10,507	150	371	541	489	1,330	68	20,234
21-year-olds	2,753	1,154	139	6,852	78	231	340	343	965	45	12,900
Total 13 to 21	892,059	177,689	76,317	323,169	7,234	16,749	17,317	22,766	24,386	362	1,558,048
Total 14 to 21	710,653	145,277	51,752	276,221	5,911	13,890	14,673	19,388	19,270	326	1,257,361
Total 15 to 21	524,204	109,197	33,489	223,233	4,615	10,846	11,748	15,364	15,394	293	948,383
NLTS estimates											
13-year-olds	136,909	24,707	12,546	40,374	1,356	2,519	2,113	3,580	3,270	6	227,380
14-year-olds	160,771	34,529	12,615	56,888	1,288	3,588	2,585	2,070	3,847	6	278,187
15-year-olds	188,761	32,492	9,294	62,853	1,786	3,218	3,182	4,631	2,936	22	309,175
16-year-olds	138,249	27,422	6,229	55,643	1,226	3,655	3,608	3,410	3,026	9	242,477
17-year-olds	114,396	21,701	4,859	48,728	1,100	2,863	2,619	2,560	2,090	10	200,926
18-year-olds	58,120	8,536	2,806	44,337	679	1,938	2,588	1,679	2,223	0	122,912
19-year-olds	16,407	3,444	756	22,930	266	1,339	825	747	1,959	4	48,677
20-year-olds	3,336	1,016	180	11,742	154	807	351	328	1,446	6	19,366
21-year-olds	379	819	37	5,593	103	333	185	133	1,054	10	8,646
		140,851	45,543	264,486	6,756	15,843	14,107	16,251	15,169	53	1,258,145
Total 13 to 21	817,334	154,666	49,322	349,088	7,958	20,260	18,056	19,138	21,851	73	1,457,746
Total 14 to 21	680,425	129,959	36,776	308,714	6,602	17,741	15,943	15,558	18,581	67	1,230,366
Total 15 to 21	519,654	95,430	24,161	251,826	5,314	14,153	13,358	13,488	14,734	61	952,179
NLTS/Annual report											
Total 13 to 21	0.92	0.87	0.65	1.08	1.10	1.21	1.04	0.84	0.90	0.20	0.94
Total 14 to 21	0.96	0.89	0.71	1.12	1.12	1.28	1.09	0.80	0.96	0.21	0.98
Total 15 to 21	0.99	0.87	0.72	1.13	1.15	1.30	1.14	0.88	0.96	0.21	1.00

Note: Both NLTS estimates and *10th Annual Report to Congress* counts of special education students reported in this table exclude students in state-operated schools. NLTS estimates include only students in grades 7 and above; some 13- and 14-year- olds in the *10th Annual Report to Congress* may be in grade 6 or below.

section on LEA bias, the participation rate was lower among K-8 districts than among districts that also served grades 9 and above, introducing a slight downward bias in the NLTS counts of younger special education students. For these reasons, the most appropriate comparison is between the number of 15- to 21-year-olds in the NLTS and the figures in the *10th Annual Report to Congress*.

As mentioned earlier, the NLTS accurately estimates the total number of 15- to 21-year-old special education students. Within disability categories, the accuracy of NLTS estimates appears to vary substantially. The NLTS almost correctly estimates the number of 15- to 21-year-old learning disabled students (i.e., the NLTS estimate is 99% of the OSEP count). The NLTS slightly underestimates the number of students with multiple handicaps (i.e., the NLTS estimate is 96% of the OSEP count), moderately underestimates the number of students classified as other health impaired and emotionally disturbed (i.e., 88% and 87% of the OSEP counts, respectively), and substantially underestimates those classified as speech impaired or deaf/blind (i.e., 72% and 21%, respectively). The NLTS moderately overestimates the number of students classified as visually impaired, orthopedically impaired, and mentally retarded (i.e., 115%, 114%, and 113% of OSEP counts, respectively) and substantially overestimates the combined number of students who were deaf or hard of hearing (i.e., 130%). The discrepancy in the number of deaf/blind students is attributable to their scarcity outside the state-operated schools. As explained earlier, three deaf/blind students in medium- and smaller-sized LEAs were excluded from the NLTS because their weights (which totaled approximately 200) were substantially larger than the weights of the other 100 respondents. Inclusion of these students would have yielded much more comparable (if still very unstable) estimates of the number of deaf/blind students outside state-operated schools, but would dramatically have decreased the precision of estimates for deaf/blind students.

Other than for deaf/blind students, the discrepancies between the NLTS estimated numbers of 15- to 21-year-old students and the OSEP counts are not readily explainable. Because responding students are weighted up to the total number of students in the appropriate disability category on the LEA rosters, these discrepancies cannot be associated with nonresponse rates to either the telephone or in-person parent/guardian surveys, the student record abstract survey, or the school program survey. That is, approximately the same totals would have been estimated by the NLTS whether the response rates to the different data collection instruments had been substantially lower or higher than they were.* The obvious potential cause for differences in counts would be differential participation rates for LEAs within size strata as a function of the number of special education students served. That is, LEAs with more (or fewer) special education students than other LEAs in their size stratum might

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* The totals would be exactly the same, except for the influence of the income adjustments for non-response bias. However, we estimate the effect of the income adjustments to be no more than 1-2%.

have been more (or less) willing to participate in the NLTS than other LEAs in their size stratum. However, we then would have expected a uniform under- or overestimation of the number of special education students across disability categories. Instead, we find some categories (such as mentally retarded) overestimated and some (such as emotionally disturbed) underestimated. Having ruled out this potential cause, we are at a loss to explain these discrepancies (other than attributing them to sampling variability).

Potential Study Limitations Related to Sampling Issues

The NLTS data are being made available to a broad community. Making data available for use in the public domain entails the risk that they will be used to support mistaken interpretations because of a failure to account for sample limitations. These potential risks are offset by the benefits to be derived from wide dissemination and use of the rich NLTS database to address myriad questions in the field about the experiences of youth with disabilities in transition. However, to minimize the potential that data will be misinterpreted, the user should keep in mind the following considerations related to the NLTS sample:

- ***Subgroup definitions.*** Youth were sampled from disability categories based on the primary disability designated by the youth's district in the 1985-86 school year. Category definitions, assessment procedures, and rules of thumb for categorizing students vary between states and often between school districts within states. NLTS data should not be interpreted as generalizing to youth who truly had a particular disability, but rather to youth who were categorized as having that disability by their school district.

- ***Potential bias associated with LEA nonparticipation.*** Because the participation rate among LEAs in the main study was slightly less than 50%, we were concerned whether participating LEAs differed from nonparticipating LEAs. Comparison of nonparticipating LEAs with 1,600 LEAs from which they were sampled revealed no systematic differences across a wide range of variables. However, there is no assurance that nonparticipating LEAs did not differ systematically from participating LEAs in other (unmeasured) ways.

- ***Potential bias associated with parent/guardian nonparticipation.*** Of the 12,833 sampled youth, 6,694 parent interviews were completed (or almost completed) over the telephone. Thus, there was concern that the participating parents/guardians differed from nonparticipants. An in-person interview of 554 nonrespondents (with an additional 441 completed interviews) was conducted to determine the extent of parent/guardian nonresponse bias. This substudy showed that there were differences between the two populations, which mostly could be removed by reweighting the income distribution of all respondents. However, there is no assurance that the reweighting procedure eliminated all differences between respondents and nonrespondents, as a consequence of features of the nonresponse survey that render it less than a fully representative sample of nonrespondents (i.e., its concentration in urban areas, the decision not to conduct in-person interviews with those who had actively refused to participate in the telephone interview or in districts that would not

provide data on parent names and addresses, and a 20% nonparticipation rate in the nonresponse survey). In addition, it is possible that there were dimensions other than those that we examined on which participants and nonparticipants differed (e.g., other variables or variable correlations).

- ***Potential bias associated with inability to obtain school record abstracts and school program surveys.*** Record abstracts were obtained for 6,225 of the 12,833 sample members, and school program surveys were obtained for 6,672 sample members. Those with and without school record abstracts appeared to differ primarily with respect to enrollment status (it being easier to locate school records and convince school administrators to complete the school program survey when the sampled youth were currently enrolled) and secondarily with respect to factors that might explain lower enrollment rates (i.e., household demographics) or be associated with leaving school (i.e., school completion status of dropping out and no longer living at home). In addition, it is possible that there were dimensions other than those that we examined on which youth with and without these data collection instruments differed.

- ***Potential bias associated with weighting multiple instruments.*** There were three important instruments from which we obtained data: the parent/guardian survey (both the telephone version and the in-person version), the school record abstract, and the school program survey. There were some overlaps of variables in these instruments (particularly with respect to key outcome variables), and composite variables were formed when information from two or more sources was available. Rather than develop and publish a series of weights—one for each instrument and combination of instruments—we elected to develop and publish a single set of weights for all respondents with at least a complete or almost complete parent/guardian survey or a school record abstract. This greatly simplifies the practical aspects of performing tabulations, cross-tabulations, and other analyses. However, it yields suboptimal weights for each instrument and combination of instruments. To check the reasonableness of this decision, we developed preliminary weights based on different combinations of instruments and compared variable tabulations and cross-tabulations using these different sets of weights. We found the results to be robust to the particular weights used. However, there is no assurance that all possible weights would yield equivalent results for all possible analyses.

- ***Bias associated with student exit from secondary school before sample selection.*** Because students were selected from the 1985-86 school year rosters, the student universe excluded special education students who had left school before that date and were removed from the rosters. The 13- to 15-year-old cohort is probably not severely affected by this exclusion. The 16- to 18-year-old cohort probably excludes a number of the mildly handicapped, who graduated or otherwise left school. The 19-year-old and above cohort tends to contain the moderately to severely handicapped who are more likely to remain in secondary school to the legal age limit (often 21). Thus, data from this first wave presents a biased view of older special education students. Because there were fewer disabled students age 19 and above in the universe than in other age groups, this bias should be modest in analyses that include other age groups. This bias should be remedied in the 1990 data collection effort, when the 13- to 15-year-old cohort (which is essentially unaffected by this type of censoring) will be 18 to 20 years old, allowing older special education students to be more representatively characterized.

- ***Potential bias associated with weight truncation.*** Students in three low-incidence disability categories (deaf, orthopedically impaired, and visually impaired) were found infrequently in medium- and smaller-sized districts, but often enough that they would have been assigned extremely large weights if they had been allowed to represent fully the special education students with these disabilities in those districts. It was considered advisable to adjust these weights downward to increase the effective sample size. Weights of these students in the small and medium-size district strata were adjusted slightly downward, and corresponding increases were made to the weights of students in the large district stratum (under the assumption that students in large and sometimes very large districts would more closely resemble students in medium- and smaller-sized districts than students in huge districts). Responses before and after these weighting adjustments were nearly identical (see Table 10), but there is no assurance that they would be identical for all possible analyses. In addition, because there were only three deaf/blind respondents from medium- or smaller-sized districts, and these three respondents had large weights, they were discarded. Thus, NLTS results do not represent deaf/blind students in medium- or smaller-sized LEAs, whose numbers cannot be accurately estimated from the NLTS survey.

- ***Item nonresponse.*** In addition to the absence of whole instruments from which an item was taken, respondents may have failed to provide answers for specific questions. Usually, means and percentages are calculated on the basis of the responses from those for whom the question was appropriate and who answered the question. There is no assurance that those who failed to answer an appropriate question (that is, who were led by the questionnaire skip logic to the question but who declined to answer) are similar to those who answered the question. However, the extent of missing data can be assessed for each question. Item response rates for the NLTS data collection instruments were very high, with the exception of household income, IQ, and number of days absent from school.

Overall Assessment of Data Usefulness

The NLTS study is the largest and most comprehensive research effort ever conducted about secondary special education students in the United States. For it to fulfill its purpose of providing useful information to practitioners, policymakers, researchers, and others in the special education community regarding the transition of youth with disabilities from secondary school to early adulthood, the data must meet high standards of quality. As documented in this report, the NLTS has been subject to relatively high nonresponse rates. Therefore, it is necessary to address the issue of whether high nonresponse rates have compromised the usefulness of the data, and what types of analyses would be most appropriate in the presence of high nonresponse rates.

To place the nonresponse issue in perspective, it is useful to consider (1) traditional survey research procedural standards, (2) traditional survey research response rates,

(3) the sources of nonresponse (4) the magnitudes of nonresponse biases, and (5) traditional studies in special education.

(1) The procedures followed in the NLTS meet a very high standard for traditional survey research. Considerable care and skill went into research design and into extensive efforts to persuade unwilling districts to participate, locate and persuade parents to participate, locate school records, investigate biases, and calculate appropriate weights. Thus, high nonresponse rates were not a result of inadequate procedures.

(2) The response rates for the NLTS were lower than those typically obtained in traditional survey research, which are in the range of 70% to 85%. Much of the difference was attributable to special circumstances of the NLTS that are not present in traditional surveys, especially the need to sample LEAs and state-operated schools and obtain their participation, the reluctance of some LEAs to provide rosters, and the lack of telephones of many parents/ guardians. If we compare NLTS response rates with traditional random digit telephone surveys, after adjusting for these special circumstances, we find the response rates to be favorable. For example, out of the 12,833 students selected for the sample, 4,502 were nonrespondents for special circumstances not found in traditional random digit dialing telephone surveys (i.e., 1,632 youth whose names were not revealed by the school district because their parents did not return a consent form and therefore could not be called or located by mail, 636 youth who had inaccurate location information and whose parents could not be located by mail or telephone, 43 youth who were deceased, 187 youth who had no adult who could respond for the youth, and 2,004 youth who had no working telephone number and whose parent/guardian would not call a toll-free number). Out of the remaining 8,331 sampled youth, complete or almost complete parent/ guardian telephone surveys were obtained for 6,693 youth (and an additional 441 respondents were obtained via in-person surveys). Thus, on a comparable basis to random digit dialing surveys, the response rate was 6,693 / 8,331 = 80.3%. Nevertheless, special circumstances resulted in overall response rates that were sufficiently low so that there always will be some question concerning the representativeness of survey results.

(3) Although there were a variety of sources of nonresponse, the most severe was the unwillingness of LEAs and state-operated schools to participate or to release the names and addresses of parents before obtaining their written permission. Unwillingness to participate resulted in the loss of 51.8% of the sampled LEAs and 73.8% of the sampled state-operated schools. Unwillingness to provide rosters to SRI resulted in the loss of 1,632 students out of an original sample of 12,833. In the absence of a legislative requirement or substantial financial incentive for LEA/school participation, it is unlikely that any study of special education students would be able to improve these nonresponse rates substantially. Other sources of nonresponse included inaccurate location information, inability to locate school records, and the presence of large numbers of households that lacked a working telephone. Decreasing nonresponse rates from inaccurate location information would require implementing a prospective survey design, and decreasing nonresponse rates from a lack of telephones would require conducting in-person interviews. These alternatives would have increased survey costs substantially.

(4) Our examination of the magnitude of response bias attributable to LEA nonparticipation, nonresponse by parents/guardians, inability to locate school records, and item nonresponse gives us reason to believe that these biases would not seriously jeopardize the representativeness of the NLTS database. The most serious potential problem was caused by nonresponse bias in the parent/guardian interview, and we believe that our income weighting adjustments have been successful in substantially reducing those biases. We are particularly encouraged by our ability to predict school status using the weighted parent/guardian and school record abstract data. However, there are no guarantees.

(5) The NLTS far exceeds the scope of previous transition research studies in special education. Previous research focused on single states and/or disability categories, contained small samples, and were subject to the same types of response rates and nonrespondent errors.

Despite the effort that has gone into quantifying and minimizing nonresponse bias (via a nonresponse survey and reweighting) and the encouraging results of these efforts, there will always be some uncertainty concerning NLTS representativeness relative to the entire universe of special education students. All available evidence suggests that the NLTS can yield valid results for a large portion of the special education student universe. For example, analyses conducted by SRI International on NLTS data (e.g., Wagner et al., 1990) have yielded point estimates and relationships among variables that are entirely consistent with other research with which we are familiar in special education and regarding the general population of youth. However, NLTS estimates of the number of special education students in some disability categories are not as consistent as we would have desired with counts in the *10th Annual Report to Congress*. Also, it is not clear that all special education students are fully represented. Nonresponse biases appear to be related to lower participation rates by lower-income students and those who had left school before graduation. Therefore, there is a possibility that the NLTS results, while accurately portraying the experiences of the vast majority of special education students, may have failed to capture completely the experiences of a small minority of special education students.

Even with these concerns, we believe that the NLTS database is more than merely adequate. It is both good and representative, and will prove useful and valid for policy decisions and for social and scientific analysis. The NLTS meets very high standards with respect to its procedures. Although its overall response rate was low because of special causes not present in traditional survey research, when measured on a basis comparable to traditional random digit dialing telephone research, response rates were very good. Furthermore, the NLTS far exceeds the scope of previous transition research studies in special education, and can provide insights not previously available from other sources. It also represents the best data that can be obtained without incurring extraordinary costs. Higher response rates in special education surveys of this type will not be obtained until special causes of nonresponse are addressed via legislative sanctions and/or incentives for LEA/school participation and disclosure of rosters. Prospective survey designs with in-person interviews also would be required.

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